SOIL SURVEY OF
Allegheny County, Pennsylvania

United States Department of Agriculture
Soil Conservation Service
In cooperation with
The Pennsylvania State University
College of Agriculture and
Pennsylvania Department of Environmental Resources
State Conservation Commission

This is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and agencies of the States, usually the Agricultural Experiment Stations. In some surveys, other federal and local agencies also contribute. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in the period 1964–72. Soil names and descriptions were approved in 1973. Unless otherwise indicated, statements in the publication refer to conditions in the county in 1972. This survey was made cooperatively by the Soil Conservation Service, The Pennsylvania State University, College of Agriculture, and Pennsylvania Department of Environmental Resources, State Conservation Commission. It is part of the technical assistance furnished to the Allegheny County Conservation District. The soil survey was financed in part through funds provided by the Allegheny County Commissioners.

HOW TO USE THIS SOIL SURVEY

THIS SOIL SURVEY contains information that can be applied in managing farms, woodlands, and wildlife areas; in selecting sites for roads, ponds, buildings, and other structures; and in judging the suitability of tracts of land for farming, communities, industry, and recreation.

Locating Soils

All the soils of Allegheny County are shown on the detailed map at the back of this publication. This map consists of many sheets made from aerial photographs. Each sheet is numbered to correspond with a number on the Index to Map Sheets.

On each sheet of the detailed map, soil areas are outlined and are identified by symbols. All areas marked with the same symbol are the same kind of soil. The soil symbol is inside the area if there is enough room; otherwise, it is outside and a pointer shows where the symbol belongs.

Finding and Using Information

The "Guide to Mapping Units" can be used to find information. This guide lists all the soils of the county in alphabetic order by map symbol and gives the capability classification of each. It also shows the page where each soil is described.

Individual colored maps showing the relative suitability or degree of limitation of soils for many specific purposes can be developed by using the soil map and the information in the text. Translucent material can be used as an overlay over the soil map and colored to show soils that have the same limitation or suitability. For example, soils that have a slight limitation for a given use can be colored green, those with a moderate limitation can be colored yellow, and those with a severe limitation can be colored red.

Farmers and those who work with farmers can learn about use and management of the soils from the soil descriptions, from the descriptions of the capability units, and from the woodland interpretations.

Foresters and others can refer to the section "Woodland," where the soils of the county are rated according to their suitability for trees.

Wildlife managers and others can find information about soils and wildlife in the section "Wildlife."

Community planners and others can read about soil properties that affect the choice of sites for nonindustrial buildings and for recreation areas in the sections "Use of the Soils for Town and Country Planning" and "Use of the Soils for Recreation Facilities."

Engineers and builders can find, under "Engineering Uses of the Soils," tables that contain test data, estimates of soil properties, and information about soil features that affect engineering practices.

Scientists and others can read about the soils in the section "Formation, Morphology, and Classification of the Soils."

Newcomers in the area may be especially interested in the section "General Soil Map," where broad patterns of soils are described. They may also be interested in the information about the county given in the section "Environmental Factors Affecting Soil Use."

Cover: The city of Pittsburgh is an example of the intensive use of soil resources in Allegheny County. Photo courtesy of Gulf Oil Corporation.

Contents

Issued August 1981

Index to Mapping Units

Summary of Tables

SOIL SURVEY OF ALLEGHENY COUNTY, PENNSYLVANIA

BY RAYMOND L. NEWBURY, DAVID J. BELZ, AND ROBERT G. GRUBB, SOIL CONSERVATION SERVICE

UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, IN COOPERATION WITH THE PENNSYLVANIA STATE UNIVERSITY, COLLEGE OF AGRICULTURE, AND PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL RESOURCES, STATE CONSERVATION COMMISSION

ALLEGHENY COUNTY is in the southwestern part of Pennsylvania (fig. 1). The county has more than 727 square miles of land area. The Allegheny and Monongahela Rivers join near the center of the county to form the Ohio River. These rivers comprise most of the more than 14 square miles of water area in the county. In 1972 the population of the county was approximately 1.6 million. Pittsburgh, the largest metropolitan area of southwestern Pennsylvania, is in the center of the county. It covers more than 55 square miles, is the largest city in the county, and is the county seat.

The soils in Allegheny County influence and are influenced by land use. The land area of Pittsburgh and that along the three rivers is mainly in intensive industrial, commercial, and residential uses. Much of the soil has been greatly altered and is covered by buildings and other urban structures. Areas beyond the intensively used urban core are under continuing suburban development. Sewer systems generally are needed in these areas because in more than 85 percent of the county the soils have severe limitations for use as septic tank disposal fields. Depth to bedrock, a seasonal high water table, and susceptibility to landslides are other common limitations for suburban development.

The outermost areas of the county are mostly idle land, woodland, and recreational areas. There are scattered farms. About 9 percent of the acreage in the county is farmed. Generally, crop yields are fair to good.

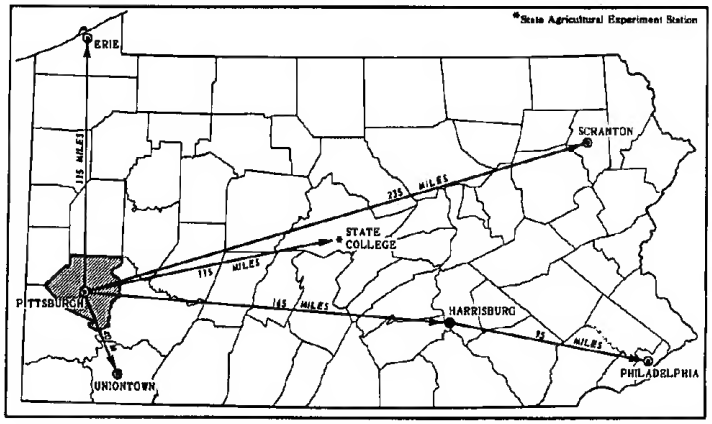


Figure 1.—The location of Allegheny County in Pennsylvania.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soil are in Allegheny County, where they are located, and how they can be used. The soil scientists went into the county knowing they likely would find many soils they had already seen and perhaps some they had not. They observed the steepness, length, and shape of the slopes, the size and speed of streams, the kinds of native plants or crops, the kinds of rock, and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material that has not been changed much by leaching or by the action of plant roots.

The soil scientists made comparisons among the profiles they studied, and they compared them with profiles in counties nearby and in places more distant. They classified and named the soils according to nationwide, uniform procedures. The *soil series* and the *soil phase* are the categories of soil classification most used in a soil survey.

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, all soils of one series have major horizons that are similar in thickness, arrangement, and other important characteristics. Each soil series is named for a town or other geographic feature near the place where a soil of that series was first observed and mapped. Gilpin and Library, for example, are the names of two soil series. All the soils in the United States having the same series name are essentially alike in those characteristics that affect their behavior in the undisturbed landscape.

Soils of one series can differ in texture of the surface layer and in slope, stoniness, or some other characteristic that affects use of the soils. On the basis of such differences, a soil series is divided into phases. The name of a soil phase indicates a feature that affects management. For example, Gilpin silt loam, 2 to 8 percent slopes, is one of several phases within the Gilpin series.

After a guide for classifying and naming the soils had been worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodland, buildings, field borders, trees, and other details that help in drawing boundaries accurately. The soil map at the back of this publication was prepared from aerial photographs.

The areas shown on a soil map are called mapping units. On most maps detailed enough to be useful in planning the management of farms and fields, a mapping unit is nearly equivalent to a soil phase. It is not exactly equivalent, because it is not practical to show on such a map all the small, scattered bits of soil of some other kind that have been seen within an area that is dominantly of a recognized soil phase.

Some mapping units are made up of soils of different series or of different phases within one series. Two such kinds of mapping unit are shown on the soil map of Allegheny County: soil complexes and undifferentiated groups.

A soil complex consists of areas of two or more soils, so intricately mixed or so small in size that they cannot be shown separately on the soil map. Each area of a complex consists of some of each of the two or more dominant soils, and the pattern and relative proportion are about the same in all areas. Generally, the name of a soil complex consists of the names of the dominant soils, joined by a hyphen. Gilpin-Upshur complex, 8 to 15 percent slopes, is an example.

An undifferentiated group is made up of two or more soils that could be delineated individually but are shown as one unit because, for the purpose of the soil survey, there is little value in separating them. The pattern and proportion of the soils are not uniform. An area shown on the map can be made up of only one of the dominant soils or of two or more. If there are two or more dominant soils in the group, the name of the group ordinarily consists of the names of the dominant soils, joined by "and." Gilpin, Weikert, and Culleoka shaly silt loams, very steep, is an example.

In some areas there are places where the soil material is so rocky, so shallow, so severely eroded, or so variable that it is not classified by soil series. These places are shown on the soil map and are described in the survey, but they are called land types and are given descriptive names. Gullied land is an example.

While a soil survey is in progress, soil scientists take soil samples needed for laboratory measurements and for engineering tests. Laboratory data from the same kind of soil in other places are also assembled. Data on yields of crops under defined practices are assembled from farm records and from field or plot experiments on the same kind of soil. Yields under defined management are estimated for all the soils.

Soil scientists observe how soils behave when used as a growing place for native and cultivated plants, and as material for structures, foundations for structures, or covering for structures. They relate this behavior to properties of the soils. For example, they observe that filter fields for onsite disposal of sewage fail on a given kind of soil, and they relate this to the slow permeability of the soil or its high water table. They see that streets, road pavements, and foundations for houses are cracked on a named kind of soil, and they relate this failure to the high shrink-swell potential of the soil material. Thus, they use observation and knowledge of soil properties, together with available research data, to predict limitations or suitability of soils for present and potential uses.

After data have been collected and tested for the key, or benchmark, soils in a survey area, the soil scientists set up trial groups of soils. They test these groups by further study and by consultation with farmers, agronomists, engineers, and others. They then adjust the groups according to the results of their studies and consultation. Thus, the groups that are finally evolved reflect up-to-date knowledge of the soils and their behavior under current methods of use and management.

General Soil Map

The general soil map at the back of this survey shows, in color, the soil associations in Allegheny County. A soil association is a landscape that has a distinctive pattern of soils in defined proportions. It typically consists of one or more major soils and at least one minor soil, and it is named for the major soils. The soils in one association can occur in another, but in a different pattern.

A map showing soil associations is useful to people who want a general idea of the soils in a county, who want to compare different parts of a county, or who want to locate large tracts that are suitable for a certain kind of land use. Such a map is a useful general guide in evaluating large areas, such as a watershed, or in county-wide planning for community development, recreation, and open space. It is not a suitable map for planning the management of a farm or field or for selecting a site for a road or building or other structure, because the soils in any one association ordinarily differ in slope, depth, stoniness, drainage, and other characteristics that affect their management.

The soil associations in this survey have been grouped into two general kinds of landscapes for broad interpretative purposes. Each broad group and the soil associations in each group are described in the following pages.

Areas Dominantly Unaltered by Urban Development and Strip Mines

These soil associations make up about 74 percent of the county. The land has not been greatly altered by excavation, strip mining, or reshaping. Buildings and other urban structures do not cover the soil extensively. Much of the acreage consists of natural, undisturbed soils.

1. Gilpin-Upshur-Atkins association

Moderately deep and deep, well drained soils underlain by red and gray shale on uplands and deep, poorly drained soils on flood plains

This association is mainly on steep and very steep sides of valleys, but it includes narrow, nearly level flood plains (fig. 2). Seepage spots in wet periods and spring are common on the valley sides. There is evidence of recent landslides.

This association makes up about 15 percent of the county. It is about 50 percent Gilpin soils, 10 percent Upshur soils, and 5 percent Atkins soils. The remaining 35 percent is mainly Philo, Hazleton, Clymer, Ernest, Vandergrift, and Weikert soils.

Gilpin soils are well drained and are moderately

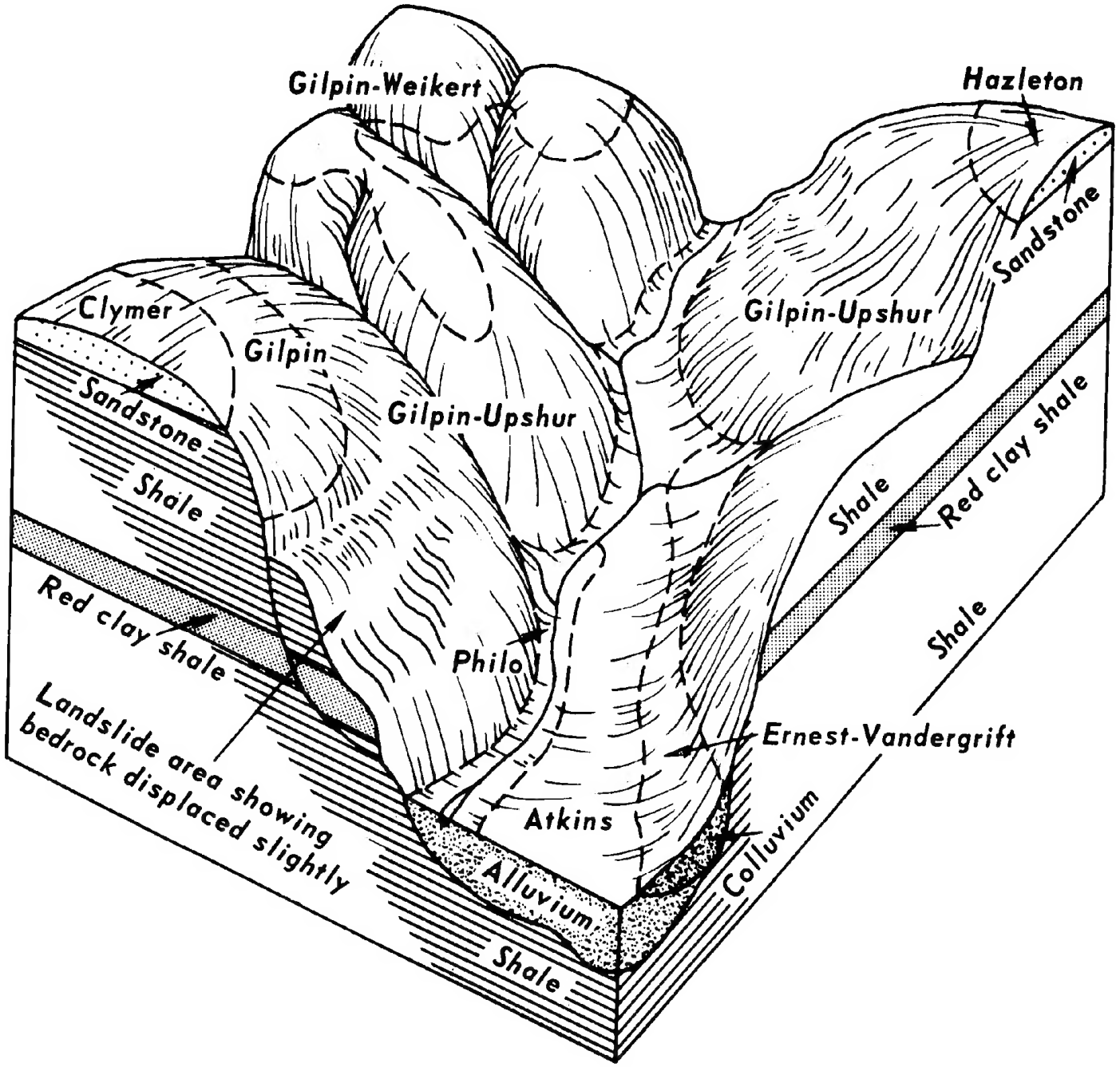


Figure 2.—**The pattern of soils and underlying material in the Gilpin-Upshur-Atkins soil association.**

deep to shale and fine grained sandstone bedrock. They are on the sides of valleys.

Upshur soils are well drained and are deep to red clay shale bedrock. They are on the sides of valleys.

Atkins soils are deep and poorly drained and have a high water table. They are on flood plains.

This association is mostly wooded. It has severe limitations for uses other than trees, mainly because of slides, and the hazard of flooding on the flood plains. the slope, the susceptibility of the steeper soils to land-

2. *Gilpin-Weikert-Atkins association*

Shallow and moderately deep, well drained soils underlain by gray shale on uplands and deep, poorly drained soils on flood plains

This association is mainly on steep and very steep sides of valleys, but it includes narrow, nearly level flood plains.

county. It is about 50 percent Gilpin soils, 15 percent

This association makes up about 5 percent of the

Weikert soils, and 5 percent Atkins soils. The remaining 30 percent is mainly Ernest, Philo, Wharton, Hazleton, and Clymer soils.

Gilpin soils are well drained and are moderately deep to shale and fine grained sandstone bedrock. They are on the sides of valleys.

Weikert soils are well drained and are shallow to shale and fine grained sandstone bedrock. They are on the sides of valleys.

Atkins soils are deep and poorly drained and have a high water table. They are on flood plains.

This association is mostly wooded. It has severe limitations for uses other than trees, mainly because of the hazard of flooding on the flood plains and steep slopes.

3. *Culleoka-Weikert-Newark association*

Shallow and moderately deep, well drained soils underlain by shale and limestone on uplands and deep, somewhat poorly drained and poorly drained soils on flood plains

This association is mainly on steep and very steep sides of valleys, but it includes narrow, nearly level flood plains (fig. 3).

This association makes up about 4 percent of the county. It is about 50 percent Culleoka soils, 10 percent Weikert soils, and 10 percent Newark soils. The remaining 30 percent is mainly Clarksburg, Lindside, Guernsey, Library, and Dormont soils.

Culleoka soils are well drained and are moderately deep to shale and limestone bedrock. They are on the sides of valleys.

Weikert soils are well drained and are shallow to shale and fine-grained sandstone bedrock. They are on the sides of valleys.

Newark soils are somewhat poorly drained and poorly drained, are deep, and have a high water table. They are on flood plains.

This association is mostly wooded. It has severe limitations for uses other than trees, mainly because of the hazard of flooding on the flood plains and steep slopes.

4. *Gilpin-Wharton-Upshur association*

Moderately deep and deep, well drained and moderately well drained soils underlain by red and gray shale on uplands

This association is on undulating to hilly uplands and is highly dissected by small streams and drainageways. Gently sloping ridgetops are generally long and nar-

***Figure 3.*—Typical landscape of Culleoka-Weikert-Newark soil association. Newark soils are on the flood plain in the foreground. Very steep Culleoka and Weikert soils are in the wooded area in the background.**

row, and high rounded knobs are scattered throughout the area (fig. 4).

This association is in the northern half of the county. It is the most extensive association, making up about 32 percent of the county. It is about 35 percent Gilpin soils, 20 percent Wharton soils, and 5 percent Upshur soils. The remaining 40 percent is Clymer, Hazleton, Rayne, Ernest, Vandergrift, Cavode, and Brinkerton soils.

Gilpin soils are well drained and are moderately deep to shale and fine grained sandstone bedrock. Slopes are generally convex.

Wharton soils are moderately well drained and are deep to gray clay shale bedrock. Slopes are generally concave.

Upshur soils are well drained and are deep to red clay shale bedrock. Slopes are commonly concave.

Clymer, Hazleton, and Rayne soils are deep and well drained. Ernest and Vandergrift soils are deep and moderately well drained. Cavode soils are deep and somewhat poorly drained. Brinkerton soils are deep and poorly drained.

Much of this association has been cleared and farmed, but now it is under continuing suburban development. Beyond the areas of suburban growth, some areas are idle, and others are used for recreation. And there are scattered farms.

Artificial drainage generally is needed on Wharton, Ernest, Vandergrift, Cavode, and Brinkerton soils. The Upshur and Vandergrift soils are susceptible to landslides. The depth to bedrock of the Gilpin, Clymer, Hazleton, and Rayne soils is a limitation for some uses.

5. *Dormont-Guernsey-Culleoka association*

Moderately deep and deep, well drained and moderately well drained soils underlain by shale and limestone on uplands

This association is on undulating to hilly uplands and is highly dissected by small streams and drainageways. Gently sloping ridgetops are generally long and narrow, and high rounded knobs are scattered throughout the area.

This association is in the southern half of the county. It makes up about 18 percent of the county. It is about 35 percent Dormont soils, 10 percent Guernsey soils, and 10 percent Culleoka soils. The remaining 45 percent is mainly Hazleton, Clarksburg, and Library soils and Urban land and Strip mines.

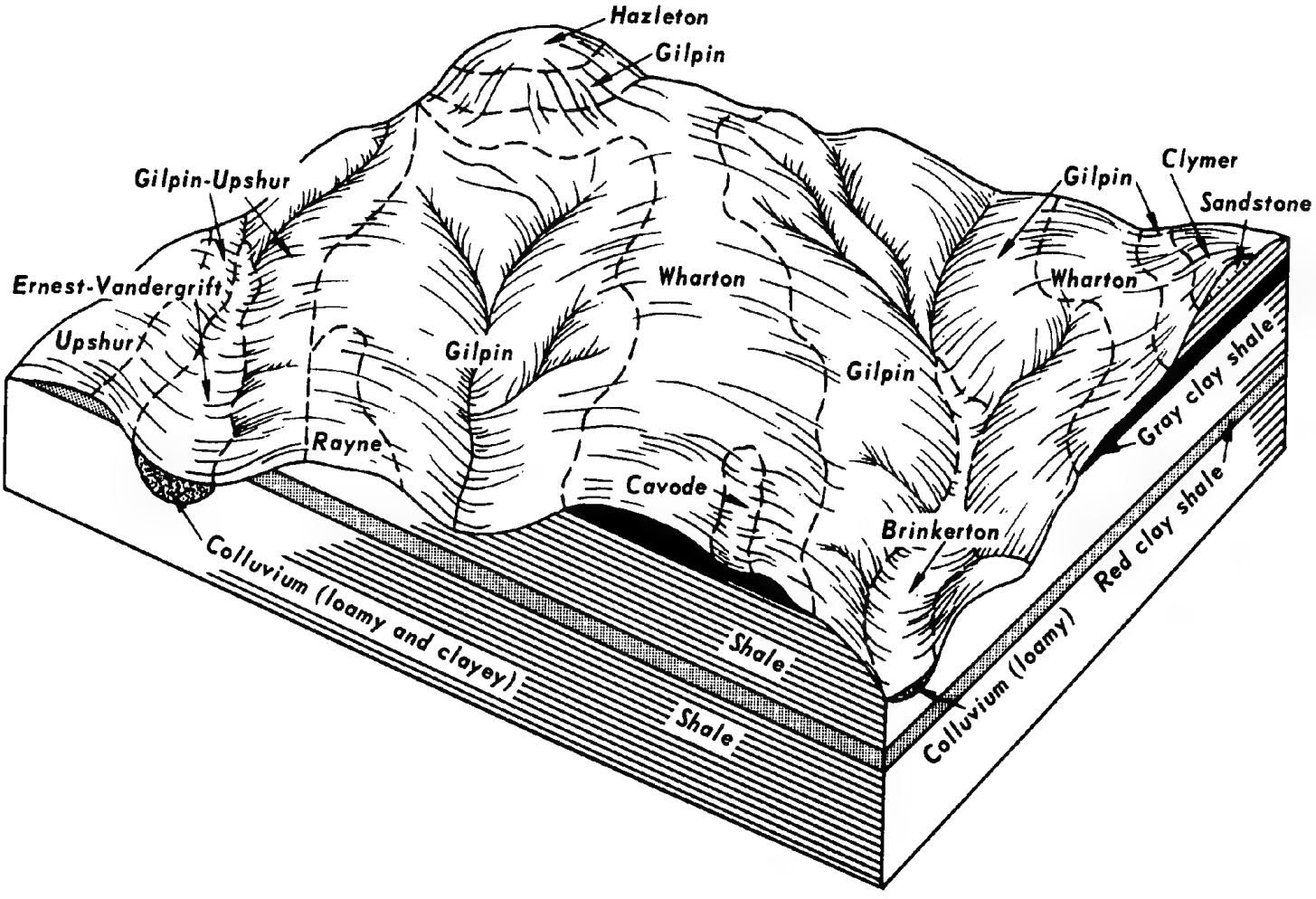


Figure 4.—The pattern of soils and underlying material in the Gilpin-Wharton-Upshur soil association.

Dormont soils are moderately well drained and are deep to shale and limestone bedrock.

Guernsey soils are moderately well drained and are deep to limestone and clay shale bedrock.

Culleoka soils are well drained and are moderately deep to shale and limestone bedrock.

Hazleton soils are deep and well drained. Clarksburg soils are deep and moderately well drained. Library soils are deep and somewhat poorly drained.

Much of this association has been cleared for farming, but now most areas are used for suburban developments or for recreation. There are scattered farms and some areas are idle.

Artificial drainage generally is needed on Dormont, Guernsey, Clarksburg, and Library soils. The depth to bedrock of the Culleoka and Hazleton soils is a limitation for some uses.

Areas Dominantly Altered by Urban Development and Strip Mines

These soil associations make up about 26 percent of the county. Most of the land has been greatly altered by excavation, reshaping, and strip mining. Buildings and other structures cover extensive areas. Areas of natural, undisturbed soils are of minor extent and are in a complex pattern with the altered land.

6. Urban land-Philo-Rainsboro association

Deep, moderately well drained soils and Urban land on flood plains and terraces

This association is mainly on nearly level bottom land adjacent to major streams.

This association makes up about 6 percent of the county. It is about 70 percent Urban land, 10 percent Philo soils, and 10 percent Rainsboro soils. The remaining 10 percent is mainly Atkins and Newark soils.

Urban land consists of areas where highly variable fill material has been placed over soils of the flood plains. Most of the land is covered by buildings or other structures.

Philo soils are deep and moderately well drained; they have a seasonal high water table.

Rainsboro soils are deep and moderately well drained. They are underlain by stratified terrace material.

Atkins soils are poorly drained, and Newark soils are somewhat poorly drained and poorly drained.

Most of this association is used for residential, commercial, and major industrial developments and for major highway and railroad routes. When the natural soils are undisturbed, the hazard of flooding and a seasonal high water table are limitations for use. Localized areas within developed areas also have a hazard of flooding.

7. Urban land-Rainsboro-Allegheny variant association

Deep, well drained and moderately well drained soils and Urban land on terraces

This association is on nearly level to rolling terraces 200 to 300 feet above the major streams.

This association makes up about 3 percent of the county. It is about 55 percent Urban land, 25 percent Rainsboro soils, and 10 percent Allegheny variant soils. The remaining 10 percent is mainly deep, moderately well drained Ernest and Clarksburg soils.

Urban land consists of areas where excavation and fill operations and urban development have greatly altered or covered much of the soil. It is underlain mainly by stratified terrace material.

The Rainsboro soils are deep and moderately well drained. They are underlain by stratified terrace deposits.

The Allegheny variant soils are deep and well drained. They also are underlain by stratified terrace deposits.

Much of this association has been cleared and farmed, but now it is used mainly for urban developments. Some areas are idle, and others are used for recreation. Some areas of the Allegheny variant soils have been mined for sand and gravel.

A seasonal high water table is a limitation for most land uses. Artificial drainage is needed on Rainsboro soils and in large areas of Urban land.

8. Urban land-Wharton-Gilpin association

Moderately deep and deep, well drained and moderately well drained soils and Urban land underlain by gray shale on uplands

This association is in the northern half of the county. It is on nearly level to hilly uplands and is highly dissected by small streams and drainageways. Gently sloping ridgetops are generally long and narrow.

This association makes up about 3 percent of the county. It is about 60 percent Urban land, 10 percent Wharton soils, and 10 percent Gilpin soils. The remaining 20 percent is mainly Clymer, Weikert, and Cavode soils.

Urban land consists of areas where excavation and fill operations and urban development have greatly altered or covered much of the soil. It is underlain mainly by gray clay shale.

Wharton soils are moderately well drained and are deep to gray clay shale bedrock.

Gilpin soils are well drained and are moderately deep to shale and fine-grained sandstone bedrock.

Clymer and Weikert soils are well drained, and Cavode soils are somewhat poorly drained.

This association is used mainly for urban developments.

A seasonal high water table is a limitation for most land uses. The Wharton and Cavode soils and large areas of Urban land need to be artificially drained.

9. Urban land-Dormont-Culleoka association

Moderately deep and deep, well drained and moderately well drained soils and Urban land underlain by shale and limestone on uplands

This association is in the southern half of the county. It is on nearly level to hilly uplands and is dissected by small streams and drainageways. Gently sloping ridgetops are generally elongated.

This association makes up 9 percent of the county. It is about 60 percent Urban land, 10 percent Dormont soils, and 10 percent Culleoka soils. The remaining 20 percent is mainly Guernsey, Clarksburg, and Library soils.

Urban land consists of areas where excavation and fill operations and urban development have greatly altered or covered much of the soil. It is underlain mainly by shale, clay shale, and limestone. In the steep and very steep fill slopes, there is evidence of numerous landslides.

Dormont soils are moderately well drained and are deep to shale and limestone bedrock.

Culleoka soils are well drained and are moderately deep to shale and limestone bedrock.

Guernsey and Clarksburg soils are deep and moderately well drained. Library soils are deep and somewhat poorly drained.

This association is used mainly for urban developments.

A seasonal high water table is a limitation for most land uses. The Dormont, Guernsey, Library, and Clarksburg soils and large areas of Urban land need to be artificially drained.

10. Strip mines-Guernsey-Dormont association

Deep, moderately well drained soils and Strip mines underlain by shale and limestone on uplands

This association is in the southern half of the county. It consists mainly of rolling to very steep areas that have been strip mined.

This association makes up about 5 percent of the county (fig. 5). It is about 70 percent Strip mines, 10 percent Guernsey soils, and 10 percent Dormont soils. The remaining 10 percent is mainly Library and Culleoka soils.

Strip mines is a land type that consists of variable spoil material.

Guernsey soils are moderately well drained and are deep to limestone and clay shale bedrock.

Dormont soils are moderately well drained and are deep to shale and limestone bedrock.

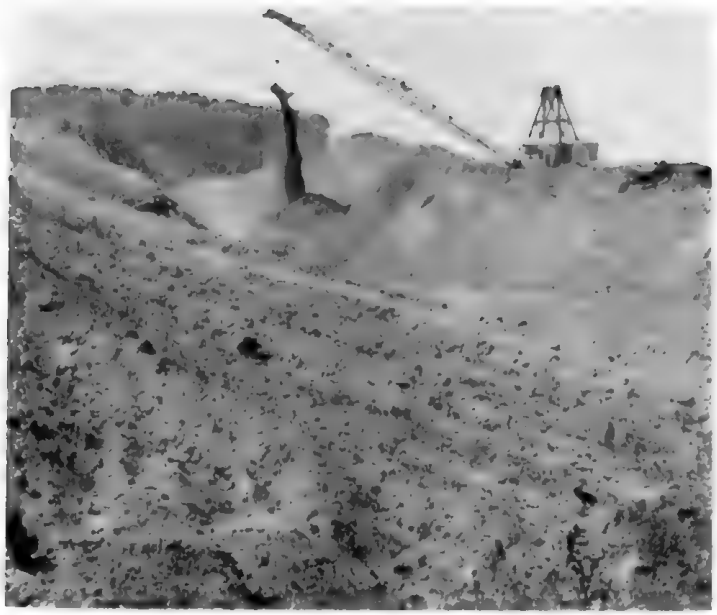


***Figure 5.*—Strip mines-Guernsey-Dormont soil association. Guernsey and Dormont soils are in the wooded area in the background.**

Library soils are deep and somewhat poorly drained, and Culleoka soils are moderately deep and well drained.

Much of this association is idle land. Depressions within the strip mined areas are filled with acid water. Vegetation is sparse. Only isolated areas have been reclaimed.

Descriptions of the Soils [1]

In this section the soils of Allegheny County are described in detail, and their use and management are discussed. Each soil series is described in detail and then, briefly, each mapping unit in that series. Unless stated otherwise, what is stated about the soil series holds true for the mapping units in that series. Thus, to get full information about any one mapping unit, it is necessary to read both the description of the mapping unit and the description of the soil series to which it belongs.

An important part of the description of each soil series is the soil profile, that is, the sequence of layers from the surface down to rock or other underlying material. The profile of each series is described twice. The first description is brief and in terms familiar to the layman. The second is more detailed and is for those who need to make thorough and precise studies of soils. The profile described is representative of mapping units in a series. If the profile of a given mapping unit is different from the one described for the series, the differences are apparent in the name of the mapping unit, or the differences are stated in describing the mapping unit. Color terms are for moist soil unless otherwise stated.

Information about the use and management of the soil is given in each description.

As mentioned in the section "How This Survey Was Made," not all mapping units are members of a soil series. Urban land, for example, does not belong to a soil series; nevertheless it is listed in alphabetic order along with the soil series.

Preceding the name of each mapping unit is a symbol that identifies the mapping unit on the detailed soil map. Listed at the end of each description of a mapping unit is the capability unit in which the mapping unit has been placed. The page where each capability unit is described is listed in the "Guide to Mapping Units" at the back of this survey.

The acreage and proportionate extent of each mapping unit are shown in table 1. Many of the terms used in describing soils can be found in the Glossary, and more detailed information about the terminology and methods of soil mapping can be obtained from the Soil Survey Manual (*10*).[2]

Allegheny Variant

The Allegheny variant consists of deep, nearly level to sloping, well-drained soils on old terraces that are as

[1] DARRELL G. GRICE, Soil Conservation Service, helped prepare this section.

[2] Italic numbers in parentheses refer to Literature Cited, p. 91.

TABLE 1.—*Approximate acreage and proportionate extent of the soils*

Soil	Area	Extent	Soil	Area	Extent
Allegheny silt loam, coarse subsoil variant, 2 to 8 percent slopes	1,115	0.2	Guernsey silt loam, 15 to 25 percent slopes	5,560	1.2
Allegheny silt loam, coarse subsoil variant, 8 to 15 percent slopes	715	.2	Guernsey-Vandergrift silt loams, 3 to 8 percent slopes	1,515	.3
Atkins silt loam	7,360	1.6	Guernsey-Vandergrift silt loams, 8 to 15 percent slopes	6,315	1.4
Brinkerton silt loam, 2 to 8 percent slopes	625	.1	Guernsey-Vandergrift silt loams, 15 to 25 percent slopes	3,495	.7
Cavode silt loam, 2 to 8 percent slopes	880	.2	Gullied land	175	(1)
Cavode silt loam, 8 to 15 percent slopes	445	.1	Hazleton loam, 3 to 8 percent slopes	240	.1
Clarksburg silt loam, 3 to 8 percent slopes	845	.2	Hazleton loam, 8 to 15 percent slopes	755	.2
Clarksburg silt loam, 8 to 15 percent slopes	1,695	.4	Hazleton loam, 15 to 25 percent slopes	995	.2
Clymer silt loam, 3 to 8 percent slopes	995	.2	Hazleton loam, steep	4,145	.9
Clymer silt loam, 8 to 15 percent slopes	1,555	.3	Huntington silt loam	235	(1)
Clymer silt loam, 15 to 25 percent slopes	1,595	.3	Library silty clay loam, 3 to 8 percent slopes	1,215	.3
Culleoka silt loam, 3 to 8 percent slopes	1,685	.4	Library silty clay loam, 8 to 15 percent slopes	1,255	.3
Culleoka silt loam, 8 to 15 percent slopes	4,625	1.0	Library silty clay loam, 15 to 25 percent slopes	630	.1
Culleoka silt loam, 15 to 25 percent slopes	8,345	1.8	Lindside silt loam	1,355	.3
Culleoka-Weikert shaly silt loams, 3 to 8 percent slopes	820	.2	Newark silt loam	2,410	.5
Culleoka-Weikert shaly silt loams, 8 to 15 percent slopes	1,390	.3	Philo silt loam	3,265	.7
Culleoka-Weikert shaly silt loams, 15 to 25 percent slopes	2,515	.5	Rainsboro silt loam, 0 to 3 percent slopes	1,385	.3
Dormont silt loam, 2 to 8 percent slopes	7,865	1.7	Rainsboro silt loam, 3 to 8 percent slopes	4,505	1.0
Dormont silt loam, 8 to 15 percent slopes	16,380	3.5	Rainsboro silt loam, 8 to 15 percent slopes	780	.2
Dormont silt loam, 15 to 25 percent slopes	13,065	2.8	Rayne silt loam, 2 to 8 percent slopes	595	.1
Dormont silt loam, 25 to 35 percent slopes	1,760	.4	Rayne silt loam, 8 to 15 percent slopes	250	(1)
Dumps, coal wastes	1,270	.3	Strip mines, 0 to 8 percent slopes	2,520	.5
Dumps, industrial wastes	1,525	.3	Strip mines, 8 to 25 percent slopes	10,150	2.2
Ernest silt loam, 2 to 8 percent slopes	4,065	.9	Strip mines, 25 to 75 percent slopes	6,630	1.4
Ernest silt loam, 8 to 15 percent slopes	5,455	1.2	Upshur silty clay loam, 3 to 8 percent slopes	430	.1
Ernest silt loam, 15 to 25 percent slopes	1,010	.2	Upshur silty clay loam, 8 to 15 percent slopes	390	.1
Ernest-Vandergrift silt loams, 3 to 8 percent slopes	165	(1)	Urban land	18,065	3.9
Ernest-Vandergrift silt loams, 8 to 15 percent slopes	745	.2	Urban land-Culleoka complex, gently sloping	11,595	2.5
Ernest-Vandergrift silt loams, 15 to 25 percent slopes	630	.1	Urban land-Culleoka complex, moderately steep	23,775	5.1
Gilpin silt loam, 2 to 8 percent slopes	9,660	2.1	Urban land-Culleoka complex, steep	7,635	1.6
Gilpin silt loam, 8 to 15 percent slopes	16,885	3.6	Urban land-Guernsey complex, gently sloping	6,325	1.3
Gilpin silt loam, 15 to 25 percent slopes	17,030	3.6	Urban land-Guernsey complex, moderately steep	11,660	2.5
Gilpin-Upshur complex, 3 to 8 percent slopes	1,455	.3	Urban land-Rainsboro complex, gently sloping	17,675	3.8
Gilpin-Upshur complex, 8 to 15 percent slopes	7,500	1.6	Urban land-Rainsboro complex, sloping	3,015	.6
Gilpin-Upshur complex, 15 to 25 percent slopes	12,730	2.7	Urban land-Wharton complex, gently sloping	2,695	.6
Gilpin-Upshur complex, very steep	52,005	11.1	Urban land-Wharton complex, moderately steep	1,675	.4
Gilpin-Vandergrift silt loams, slumped, 15 to 35 percent slopes	715	.2	Weikert-Rock outcrop complex, very steep	1,170	.3
Gilpin, Weikert, and Culleoka shaly silt loams, very steep	48,460	10.4	Wharton silt loam, 2 to 8 percent slopes	12,560	2.7
Guernsey silt loam, 2 to 8 percent slopes	2,900	.6	Wharton silt loam, 8 to 15 percent slopes	14,560	3.1
Guernsey silt loam, 8 to 15 percent slopes	6,090	1.5	Wharton silt loam, 15 to 25 percent slopes	5,140	1.1
			Quarries	55	(1)
			Gravel pits	66	(1)
			Water[2]	425	.1
			Total	465,856	100.0

[1] Less than 0.05 percent.
[2] Includes only bodies of water less than 40 acres in area of streams less than ⅛ mile wide. North Lake and the Ohio, Allegheny, Monongahela, and Youghiogheny Rivers are not included.

much as 300 feet above the flood plains of present streams. These soils formed in old acid alluvium.

In a representative profile the surface layer is about 8 inches thick. It is very dark grayish-brown silt loam in the upper 3 inches and brown silt loam in the lower 5 inches. The subsoil is 27 inches thick. In the upper 17 inches it is yellowish-brown, friable silt loam. In the 7 inches below that it is yellowish-brown, firm, gravelly loam. In the lower 3 inches it is brown, firm, gravelly sandy loam. The substratum is brown, very gravelly loamy sand.

Permeability is moderate, and the available water capacity is high.

Slope is the only limitation for land use.

Representative profile of Allegheny silt loam, coarse subsoil variant, 2 to 8 percent slopes, on the south edge of the cemetery 200 feet east of Route 02307, 1/3 mile south of its intersection with Route 02216, in Harmar Township.

Ap1—0 to 3 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, medium, granular structure; very friable, nonsticky and nonplastic; many roots; strongly acid; abrupt, smooth boundary.

Ap2—3 to 8 inches, brown (10YR 4/3) silt loam; weak, thin, platy structure; friable, slightly sticky and nonplastic; many roots; strongly acid; gradual, smooth boundary.

B21t—8 to 25 inches, yellowish-brown (10YR 5/4) silt loam; moderate, fine and medium, subangular blocky structure; friable, slightly sticky and slightly plastic; common roots; thin discontinuous clay films; 5 percent gravel; strongly acid; gradual, wavy boundary.

B22t—25 to 32 inches, yellowish-brown (10YR 5/4) gravelly loam; moderate, medium, subangular blocky structure; firm, sticky and plastic; few roots; thin discontinuous clay films; 15 percent gravel; strongly acid; gradual, wavy boundary.

IIB3—32 to 35 inches, brown (7.5YR 4/4) gravelly sandy loam; weak, coarse, subangular blocky structure; firm, slightly sticky and slightly plastic; few roots; thin discontinuous clay films; 30 percent gravel; strongly acid; clear, wavy boundary.

IIC—35 to 60 inches, brown (7.5YR 4/4) very gravelly loamy sand; single grained; loose; 60 percent gravel; strongly acid.

The solum is 30 to 40 inches thick over very gravelly loamy sand. Underlying the very gravelly loamy sand is stratified gravel, sand, and silt.

The Ap horizon is very dark grayish-brown (10YR 3/2) to dark yellowish-brown (10YR 4/4).

The Bt horizon ranges from yellowish-brown (10YR 5/6) to brown (7.5YR 4/4) and from silt loam to gravelly sandy clay loam. The upper part of the B horizon contains as much as 10 percent coarse fragments, and the lower part contains 10 to 40 percent coarse fragments. The B and C horizons are strongly acid or very strongly acid.

The C horizon ranges from brown (7.5YR 4/4) to yellowish-brown (10YR 5/6) and from very gravelly sand to gravelly loamy sand or sand. It contains thin strata of silt and clay.

Allegheny variant soils are near the moderately well drained Rainsboro soils. They lack a Bx horizon, which is a characteristic of Rainsboro soils.

AgB—Allegheny silt loam, coarse subsoil variant, 2 to 8 percent slopes. This nearly level and gently sloping soil is on old stream terraces. It has the profile described as representative of the series.

Included with this soil in mapping are small areas of Rainsboro and Ernest soils and soils that are more than 40 inches deep to very gravelly loamy sand. Also included are soils that have a surface layer of loam.

Runoff is slow to medium.

This soil has few limitations for land use. If this soil is used for disposal of sewage effluent and sanitary landfills, ground water can be contaminated. This soil is suited to all crops grown in the county. Conservation practices are needed to help control erosion. Capability unit IIe–1.

AgC—Allegheny silt loam, coarse subsoil variant, 8 to 15 percent slopes. This sloping soil is on old stream terraces. It has a profile similar to the one described as representative of the series, but it is shallower to the very gravelly loamy sand.

Included with this soil in mapping are small areas of Rainsboro, Ernest, and Rayne soils and small areas of soils that have slopes of less than 8 percent or more than 15 percent. Also included are soils that are more than 40 inches deep to very gravelly loamy sand and soils that have a surface layer of loam.

Runoff is medium.

Slope is a limitation for community development and recreation use. If this soil is used for disposal of sewage effluent or sanitary landfills, ground water can be contaminated. This soil is suited to all crops grown in the county. Conservation practices are needed to help control erosion. Capability unit IIIe–1.

Atkins Series

The Atkins series consists of deep, nearly level, poorly drained soils on flood plains adjacent to streams. These soils formed in relatively recent alluvium.

In a representative profile the surface layer is dark grayish-brown silt loam about 8 inches thick. The subsoil is 26 inches thick. In the upper 4 inches it is mottled, gray, friable silt loam. In the 8 inches below that it is mottled, light brownish-gray, friable silt loam. In the lower 14 inches it is mottled, light brownish-gray, friable loam. The substratum is mottled, light brownish-gray loam and silty clay loam.

Permeability is moderate, and the available water capacity is high. In most years the water table is at or near the surface late in winter and early in spring.

The high water table and the hazard of flooding are limitations for land use.

Representative profile of Atkins silt loam, in an idle field, 750 feet south of the Youth Development Center access road, 1/10 mile west of its intersection with U.S. Highway 19, and 150 feet due east of electric pole No. 121, in Marshall Township. (Pennsylvania Department of Transportation engineering test data samples BP-34465 and BP-34466 were taken from this profile.)

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, fine and medium, granular structure; friable, slightly sticky and slightly plastic; many roots; medium acid; abrupt, smooth boundary.

B1g—8 to 12 inches, gray (10YR 5/1) silt loam; common, fine, faint, yellowish-red (5YR 5/6) and grayish-brown (2.5Y 5/2) mottles; weak, medium, subangular blocky structure; friable, slightly sticky and slightly plastic; common roots; strongly acid; clear, wavy boundary.

B2g—12 to 20 inches, light brownish-gray (10YR 6/2) silt loam; common, fine, distinct, yellowish-red (5YR 5/6) and light brownish-gray (2.5Y 6/2) mottles; weak, medium, subangular blocky structure; friable, slightly sticky and slightly plastic; few roots; strongly acid; clear, wavy boundary.

B3g—20 to 34 inches, light brownish-gray (10YR 6/2) loam; many, fine and medium, distinct, yellowish-red (5YR 4/6) and dark reddish-brown (5YR 3/4) mottles; weak, medium, subangular blocky structure; friable, slightly sticky and slightly plastic; few roots; strongly acid; clear, wavy boundary.

C1g—34 to 44 inches, light brownish-gray (10YR 6/2) loam; many, fine and medium, distinct, light brownish-gray (2.5Y 6/2) and yellowish-brown (10YR 5/4) mottles; massive; friable, nonsticky and nonplastic; strongly acid; abrupt, wavy boundary.

IIC2g—44 to 60 inches, light brownish-gray (10YR 6/2) silty clay loam; massive; firm, sticky and plastic; strongly acid.

The solum is 30 to 40 inches thick. Bedrock is at a depth of more than 5 feet.

The Ap horizon is grayish brown (10YR 5/2) or dark grayish brown (10YR 4/2). It contains as much as 10 percent coarse fragments.

The B horizon ranges from gray (5Y 5/1) to light brownish gray (10YR 6/2) and from sandy loam to silty clay loam. It contains as much as 10 percent coarse fragments. The B and C horizons are strongly acid or very strongly acid.

The C horizon ranges from gray (5Y 5/1) to light brownish gray (10YR 6/2). It ranges from sandy loam to silty clay loam and has thin strata of sand, silt, clay, and gravel. This horizon contains as much as 20 percent coarse fragments

Atkins soils are near the moderately well drained Philo

soils and somewhat poorly drained to poorly drained Newark soils. They are more acid than Newark soils, and they are wetter than Philo soils.

At—Atkins silt loam. This nearly level soil is on narrow flood plains adjacent to intermittent and perennial streams. Slopes are 0 to 3 percent.

Included with this soil in mapping are small areas of Philo, Ernest, and Brinkerton soils and soils that have bedrock within a depth of 5 feet. Also included are soils that have a surface layer of loam and small areas of very shaly or very channery soils.

This soil receives runoff from adjacent sloping soils. It is subject to flooding during periods of intense rainfall.

Flooding and a high water table are limitations for community development, recreation use, and cultivated crops. Drainage increases the suitability for crops, but in some places drainage is not feasible because there are no adequate outlets. This soil is generally not suited to orchards because of poor air drainage. Capability unit IIIw–1.

Brinkerton Series

The Brinkerton series consists of deep, nearly level and gently sloping, poorly drained soils that have a fragipan. These soils are at the base of steeper slopes on uplands and near the head of some drainageways. They formed in colluvium that weathered from shale and sandstone.

In a representative profile the surface layer is about 8 inches thick. It is very dark brown silt loam in the upper 3 inches and light brownish-gray silt loam in the lower 5 inches. The subsoil is 36 inches thick. In the upper 16 inches it is mottled, light brownish-gray, firm silty clay loam. In the lower 20 inches, which is a fragipan, it is mottled, grayish-brown, very firm and brittle clay loam. The substratum is mottled, grayish-brown silty clay loam.

Permeability is slow, and the available water capacity is moderate. In most years the water table is at or near the surface late in winter and early in spring (fig. 6).

The high water table and slow permeability are limitations for land use.

Representative profile of Brinkerton silt loam, 2 to 8 percent slopes, in a wooded area north of Route 02035, ¼ mile west of its intersection with Brush Creek Road, in Marshall Township.

Ap1—0 to 3 inches, very dark brown (10YR 2/2) silt loam; moderate, fine, granular structure; very friable, nonsticky and nonplastic; many roots; strongly acid; abrupt, smooth boundary.

Ap2—3 to 8 inches, light brownish-gray (10YR 6/2) silt loam; few, fine, faint, light yellowish-brown (10YR 6/4) mottles; moderate, fine, granular structure; friable, nonsticky and nonplastic; many roots; strongly acid; gradual, smooth boundary.

B2tg—8 to 24 inches, light brownish-gray (2.5Y 6/2) silty clay loam; many, distinct, yellowish-brown (10YR 5/6) mottles; moderate, fine and medium, subangular blocky structure; firm, sticky and plastic; common roots; thin continuous gray (10YR 5/1) clay films; strongly acid; abrupt, smooth boundary.

Bxg—24 to 44 inches, grayish-brown (2.5Y 5/2) silty clay loam; many, medium and coarse, distinct, yellowish-brown (10YR 5/6) mottles; strong, very coarse, prismatic structure parting to moderate, very thick, platy; very firm and brittle, sticky and plastic; few roots; thick continuous gray (10YR 6/1) clay films on prisms; medium acid; gradual, wavy boundary.

Cg—44 to 60 inches, grayish-brown (2.5Y 5/2) silty clay loam; many, medium, distinct, yellowish-brown (10YR 5/6) mottles; massive; firm, sticky and plastic; 10 percent coarse fragments; medium acid.

The solum is 40 to 50 inches thick. Bedrock is at a depth of more than 5 feet. Depth to the fragipan ranges from 20 to 30 inches.

The Ap horizons, when mixed, range from grayish brown (10YR 5/2) to dark grayish brown (10YR 4/2). The A horizon contains as much as 10 percent coarse fragments.

The Bt horizon ranges from gray (10YR 6/1) to grayish-brown (2.5Y 5/2) and from silt loam to silty clay loam. It contains as much as 10 percent coarse fragments. The Bx horizon ranges from grayish-brown (2.5Y 5/2) to light brownish gray (2.5Y 6/2) and from loam to silty clay loam. It contains as much as 20 percent coarse fragments. The Bt, Bx, and C horizons are strongly acid or medium acid.

Brinkerton soils are near the moderately well drained Ernest and Clarksburg soils. They are wetter than those soils.

BrB—Brinkerton silt loam, 2 to 8 percent slopes. This nearly level and gently sloping soil is generally in long, narrow areas adjacent to and parallel to flood plains of streams.

Included with this soil in mapping are small areas of Ernest, Atkins, Cavode, and Clarksburg soils. Also included are a few areas of eroded soils and some soils that have slopes of more than 8 percent.

This soil receives runoff from adjacent, more sloping soils.

A high water table is a limitation for community development and recreation use. The high water table and a fragipan are limitations for cultivated crops. Draining the soil increases its suitability for crops. Conservation practices are needed to help control erosion. Capability unit IVw–1.

Figure 6.—**A shallow excavation early in spring reveals a high water table in Brinkerton silt loam.**

Cavode Series

The Cavode series consists of deep, nearly level to sloping, somewhat poorly drained soils on uplands. These soils formed in material that weathered from acid clay shale.

In a representative profile the surface layer is dark brown silt loam about 7 inches thick. The subsoil is 33 inches thick. In the upper 3 inches it is mottled, yellowish-brown, firm silt loam. In the 8 inches below that it is mottled, light olive-brown, firm silty clay loam. In the lower 22 inches it is mottled, grayish-brown, very firm silty clay. The substratum is mottled, olive shaly silty clay.

Permeability is slow, and the available water capacity is moderate. In most years the water table is at a depth of ½ to 1½ feet late in winter and early in spring.

The seasonal high water table, slow permeability, and slope in some areas are limitations for land use.

Representative profile of Cavode silt loam, 2 to 8 percent slopes, in an idle field, 800 feet north of Route T725, 0.65 mile west of its intersection with Brush Creek Road, in Marshall Township.

Ap—0 to 7 inches, dark-brown (10YR 4/3) silt loam; moderate, very fine, granular structure; friable, nonsticky and slightly plastic; many roots; strongly acid; abrupt, smooth boundary.

B1—7 to 10 inches, yellowish-brown (10YR 5/4) silt loam; many, medium, distinct, grayish-brown (2.5Y 5/2) and yellowish-brown (10YR 5/6) mottles; weak, medium, blocky structure; firm, sticky and plastic; many roots; strongly acid; gradual, smooth boundary.

B21t—10 to 18 inches, light olive-brown (2.5Y 5/4) silty clay loam; many, medium, distinct, yellowish-brown (10YR 5/6) and light brownish-gray (2.5Y 6/2) mottles; weak, medium, prismatic structure parting to moderate, medium, blocky; firm, sticky and plastic; few roots; thin continuous light brownish-gray (2.5Y 6/2) clay films; strongly acid; gradual, smooth boundary.

B22tg—18 to 34 inches, grayish-brown (2.5Y 5/2) silty clay; many, coarse, prominent, yellowish-brown (10YR 5/6) mottles; moderate, coarse, blocky structure; very firm, sticky and plastic; few roots; thin discontinuous olive-gray (5Y 5/2) clay films; strongly acid; gradual, smooth boundary.

B3g—34 to 40 inches, grayish-brown (2.5Y 5/2) silty clay; many, medium, distinct, light olive-brown (2.5Y 5/6) mottles; weak, coarse, blocky structure; very firm; sticky and plastic; 10 percent coarse fragments; strongly acid; gradual, wavy boundary.

C—40 to 60 inches, olive (5Y 5/3) shaly silty clay; few, fine, distinct, yellowish-brown (10YR 5/6) mottles; massive parting to weak, medium, platy structure; very firm, sticky and plastic; 15 percent soft shale fragments; strongly acid.

The solum is 30 to 50 inches thick. Bedrock is at a depth of more than 3½ feet.

The Ap horizon ranges from dark grayish brown (10YR 4/2) to dark brown (10YR 3/3). It contains as much as 10 percent coarse fragments.

The upper part of the B horizon ranges from light olive brown (2.5Y 4/4) to brown (10YR 5/3) and the lower part from grayish brown (2.5Y 5/2) to gray (10YR 6/1). The B horizon is mottled throughout. The Bt horizon ranges from silty clay loam to clay and contains as much as 15 percent coarse fragments. The B and C horizons are strongly acid or very strongly acid.

Cavode soils are near the moderately well drained Wharton, Gilpin, and Weikert soils. They are wetter than Wharton soils and are not so well drained as Gilpin and Weikert soils.

CaB—Cavode silt loam, 2 to 8 percent slopes. This nearly level and gently sloping soil is generally on ridgetops in the uplands or in long, contour areas on hillsides. It has the profile described as representative of the series. Slopes are slightly concave.

Included with this soil in mapping are small areas of Wharton, Brinkerton, Guernsey, and Gilpin soils. In some places, erosion has exposed the subsoil.

Runoff is medium.

A seasonal high water table and slow permeability are limitations for community development and recreation use. The seasonal high water table is also a limitation for cultivated crops. Drainage increases the soil's suitability for crops. Conservation practices are needed to help control erosion. Capability unit IIIw–2.

CaC—Cavode silt loam, 8 to 15 percent slopes. This sloping soil is generally in long, contour areas on hillsides. It has a profile similar to the one described as representative of the series, but it is 2 to 4 inches shallower to the substratum.

Included with this soil in mapping are small areas of Wharton, Ernest, and Gilpin soils and a few areas of eroded soils.

Runoff is medium.

A seasonal high water table, slow permeability, and slope are limitations for community development and recreation use. The hazard of erosion and the seasonal high water table are limitations for cultivated crops. Drainage increases the soil's suitability for crops. Conservation practices are needed to help control erosion. Capability unit IIIe–5.

Clarksburg Series

The Clarksburg series consists of deep, gently sloping and sloping, moderately well drained soils that have a fragipan. These soils are at the base of steeper slopes on uplands and near the head of some drainageways. They formed in colluvium that weathered from limestone, shale, and sandstone.

In a representative profile the surface layer is dark grayish-brown silt loam about 9 inches thick. The subsoil is 35 inches thick. In the upper 12 inches it is yellowish-brown, firm silty clay loam. In the 7 inches below that it is mottled, yellowish-brown, firm silty clay loam. In the lower 16 inches, which is a fragipan, it is mottled, brown, very firm and brittle silt loam. The substratum is mottled, yellowish-brown silt loam.

Permeability is slow, and the available water capacity is moderate. In most years the water table is at a depth of 1½ to 3 feet late in winter and early in spring.

The seasonal high water table, slow permeability, and slope are limitations for land use.

Representative profile of Clarksburg silt loam 8 to 15 percent slopes, in an idle field, under the powerline to the west of U.S. Highway 19, just north of its intersection with Route 02046, in Upper St. Clair Township.

Ap—0 to 9 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, fine, granular structure; friable, nonsticky and nonplastic; many roots; 5 percent coarse fragments; medium acid; clear, wavy boundary.

B21t—9 to 21 inches, yellowish-brown (10YR 5/4) silty clay loam; moderate, fine and medium, subangular

blocky structure; firm, slightly sticky and slightly plastic; common roots; thin clay films; 5 percent coarse fragments; medium acid; clear, wavy boundary.

B22t—21 to 28 inches, yellowish-brown (10YR 5/4) silty clay loam; few, fine, faint, grayish-brown (10YR 5/2) and yellowish-brown (10YR 5/6) mottles; moderate, medium, subangular blocky structure; firm, slightly sticky and slightly plastic; common roots; thin clay films; 5 percent coarse fragments; medium acid; clear, wavy boundary.

Bx—28 to 44 inches, brown (10YR 5/3) silt loam; common, fine, distinct, light brownish-gray (10YR 6/2) and yellowish-brown (10YR 5/6) mottles; moderate, very course prismatic structure parting to weak, thick, platy; very firm and brittle, slightly sticky and slightly plastic; few roots; discontinuous clay films on prism faces; 5 percent coarse fragments; medium acid; diffuse, wavy boundary.

C—44 to 60 inches, yellowish-brown (10YR 5/4) silt loam; many, medium, distinct, light brownish-gray (10YR 6/2) and yellowish-brown (10YR 5/8) mottles; massive; firm, slightly sticky and slightly plastic; 10 percent coarse fragments; medium acid.

The solum is 40 to 60 inches thick. Bedrock is at a depth of more than 5 feet. Depth to the fragipan is 20 to 30 inches.

The Ap horizon ranges from grayish brown (10YR 5/2) to dark brown (10YR 4/3).

The Bt horizon ranges from yellowish brown (10YR 5/6) to brown (7.5YR 5/4) and from silt loam to silty clay loam. This horizon contains as much as 20 percent coarse fragments. The Bx horizon ranges from yellowish brown (10YR 5/6) to brown (10YR 5/3) and from silt loam to silty clay loam. It contains 5 to 20 percent coarse fragments. Mottles having chroma of 2 or less are below a depth of 20 inches. The B and C horizons are medium acid or strongly acid.

Clarksburg soils are near poorly drained Brinkerton soils. They are better drained than those soils.

CkB—Clarksburg silt loam, 3 to 8 percent slopes. This gently sloping soil is at the base of steeper slopes on the uplands. It is generally in long, narrow, concave areas adjacent to and parallel to flood plains of streams. This soil has a profile similar to the one described as representative of the series, but it is 2 to 4 inches deeper to the substratum.

Included with this soil in mapping are small areas of Dormont, Newark, Guernsey, and Brinkerton soils. Erosion has exposed the subsoil in some places.

This soil receives runoff from adjacent, more sloping soils.

A seasonal high water table and slow permeability are limitations for community development and recreation use. The seasonal high water table, the hazard of erosion, and a fragipan are limitations for cultivated crops. Drainage increases the soil's suitability for crops. Conservation practices are needed to help control erosion. Capability unit IIe–3.

CkC—Clarksburg silt loam, 8 to 15 percent slopes. This sloping soil is at the base of steeper slopes on the uplands. It is generally in long, narrow, concave areas adjacent to and parallel to flood plains of streams. This soil has the profile described as representative of the series.

Included with this soil in mapping are small areas of Newark, Dormont, Guernsey, and Culleoka soils and soils that have slopes of less than 8 percent or more than 15 percent. Erosion has exposed the subsoil in some places.

This soil receives runoff from adjacent, more sloping soils.

A seasonal high water table, slow permeability, and slope are limitations for community development and recreation use. The hazard of erosion, the seasonal high water table, and a fragipan are limitations for cultivated crops. Drainage increases the soil's suitability for crops. Conservation practices are needed to help control erosion. Capability unit IIIe–4.

Clymer Series

The Clymer series consists of deep, gently sloping to moderately steep, well-drained soils on uplands. These soils formed in material that weathered from sandstone bedrock.

In a representative profile the surface layer is dark brown silt loam about 9 inches thick. The subsoil is 28 inches thick. In the upper 5 inches it is yellowish-brown, friable loam. In the 14 inches below that it is yellowish-brown, firm clay loam. In the lower 9 inches it is dark yellowish-brown, firm channery sandy clay loam. The substratum is dark yellowish-brown very channery loamy sand. Sandstone bedrock is below a depth of 55 inches.

Permeability is moderately rapid, and the available water capacity is moderate.

The depth to bedrock and slope in the sloping areas are limitations for land use.

Representative profile of Clymer silt loam, 3 to 8 percent slopes, along the west side of Pennsylvania Route 856, ¼ mile south of its intersection with Route 02271, in Marshall Township. (Pennsylvania Department of Transportation engineering test data samples BP-32656 and BP-32657 were taken from this profile.)

Ap—0 to 9 inches, dark-brown (10YR 4/3) silt loam; weak, fine, granular structure; friable, slightly sticky and nonplastic; many roots; strongly acid; abrupt, smooth boundary.

B1—9 to 14 inches, yellowish-brown (10YR 5/4) loam; weak, fine, subangular blocky structure; friable, slightly sticky and nonplastic; many roots; strongly acid; gradual, smooth boundary.

B21t—14 to 28 inches, yellowish-brown (10YR 5/6) clay loam; moderate, fine, subangular blocky structure; firm, slightly sticky and plastic; many roots; thin discontinuous clay films; strongly acid; gradual, smooth boundary.

B22t—28 to 37 inches, dark yellowish-brown (10YR 4/4) channery sandy clay loam; weak, medium, subangular blocky structure; firm, slightly sticky and slightly plastic; common roots; thin discontinuous clay films; 20 percent coarse fragments; strongly acid; diffuse, smooth boundary.

C—37 to 55 inches, dark yellowish-brown (10YR 4/4) very channery loamy sand; single grained; loose, nonsticky nonplastic; few roots; 80 percent coarse fragments; strongly acid; gradual, wavy boundary.

R—55 to 61 inches, dark-brown (10YR 4/3) weathered and fractured sandstone.

The solum is 34 to 40 inches thick. Bedrock is at a depth of 3½ to 6 feet.

The Ap horizon ranges from very dark grayish brown (10YR 3/2) to brown (10YR 4/3). It contains as much as 15 percent coarse fragments.

The B horizon ranges from loam to sandy clay loam or clay loam. Content of coarse fragments increases as depth increases. The upper part of the B horizon contains as much as 15 percent coarse fragments and the lower part 5 to 40 percent. The B and C horizons are strongly acid or very strongly acid.

The C horizon ranges from loamy sand to sandy loam and contains 20 to 85 percent coarse fragments.

Clymer soils are near Gilpin and Hazleton soils. They are more clayey in the B horizon than Hazleton soils, and they are deeper than Gilpin soils.

CmB—Clymer silt loam, 3 to 8 percent slopes. This gently sloping soil is on the uplands in long areas on ridgetops or in long, narrow, contour areas on hillsides. It has the profile described as representative of the series. Slopes are slightly convex.

Included with this soil in mapping are small areas of Gilpin and Hazleton soils, small areas of soils that have slopes of less than 3 percent or more than 8 percent, and soils that have a surface layer of loam. In some areas the soils are eroded and the subsoil is exposed.

Runoff is slow to medium.

The depth to bedrock is a limitation for community development and recreation use. This soil is suited to all crops grown in the county. Conservation practices are needed to help control erosion. Capability unit IIe–1.

CmC—Clymer silt loam, 8 to 15 percent slopes. This sloping soil is generally on uplands in long, narrow, contour areas on hillsides. It has a profile similar to the one described as representative of the series, but it is 2 or 3 inches shallower to the substratum. Slopes are convex.

Included with this soil in mapping are small areas of Gilpin and Hazleton soils, small areas of soils that have slopes of less than 8 percent or more than 15 percent, and soils that have a surface layer of loam. In some areas the soils are eroded and the subsoil is exposed.

Runoff is medium.

Slope is a limitation for community development and recreation use. This soil is suited to all crops grown in the county. Conservation practices are needed to help control erosion. Capability unit IIIe–1.

CmD—Clymer silt loam, 15 to 25 percent slopes. This moderately steep soil is generally in long, narrow, contour areas on hillsides. It has a profile similar to the one described as representative of the series, but it is 2 or 3 inches shallower to the substratum. Slopes are convex.

Included with this soil in mapping are small areas of Gilpin, Weikert, Hazleton, and Allegheny variant soils, small areas of soils that have slopes of less than 15 percent or more than 25 percent, and soils that have a surface layer of loam. In some areas the soils are eroded and the subsoil is exposed.

Runoff is medium.

Slope is a limitation for community development and recreation use. It is also a limitation for cultivated crops. Conservation practices are needed to help control erosion. Capability unit IVe–1.

Culleoka Series

The Culleoka series consists of moderately deep, gently sloping to very steep, well-drained soils on uplands. These soils formed in material that weathered from shale, fine grained sandstone, and limestone bedrock.

In a representative profile the surface layer is dark-brown silt loam about 7 inches thick. The subsoil is 20 inches thick. In the upper 3 inches it is yellowish-brown, friable silt loam. In the 11 inches below that it is yellowish-brown, friable silty clay loam. In the lower 6 inches it is yellowish-brown, friable channery clay loam. The substratum is yellowish-brown, firm very channery clay loam. Shale and sandstone bedrock is below a depth of 29 inches.

Permeability and the available water capacity are moderate.

The depth to bedrock and slope in some areas are limitations for land use.

Representative profile of Culleoka silt loam, 3 to 8 percent slopes, 1/5 mile due south of the intersection of Route 02240 and Route 02327, and 320 feet southwest (225°) of electric pole No. 898, in Bethel Park Borough. (Pennsylvania Department of Transportation engineering test data samples BP-23306 and BP-23307 were taken from this profile.)

Ap—0 to 7 inches, dark-brown (10YR 4/3) silt loam; weak, fine, granular structure; friable, nonsticky and slightly plastic; many roots; strongly acid; abrupt, smooth boundary.

B1—7 to 10 inches, yellowish-brown (10YR 5/4) silt loam; moderate, fine and medium, subangular blocky structure; friable, slightly sticky and slightly plastic; common roots; discontinuous clay films; 10 percent coarse fragments; strongly acid; clear, wavy boundary.

B21t—10 to 21 inches, yellowish-brown (10YR 5/6) silty clay loam; moderate, medium, subangular blocky structure; friable, slightly sticky and slightly plastic; few roots; thin continuous clay films; 10 percent coarse fragments; strongly acid; clear, wavy boundary.

B22t—21 to 27 inches, yellowish-brown (10YR 5/6) channery clay loam; moderate, medium, subangular blocky structure; friable, slightly sticky and slightly plastic; few roots; thin discontinuous clay films; 35 percent coarse fragments; strongly acid; clear, wavy boundary.

C—27 to 29 inches, yellowish-brown (10YR 5/4) very channery clay loam; massive parting to horizontal shale bedrock structure; firm; nonsticky and nonplastic; few roots; 80 percent coarse fragments; medium acid; abrupt, smooth boundary.

R—29 inches, brown (10YR 5/3) weathered and fractured shale and sandstone.

The solum is 20 to 37 inches thick. The depth to bedrock is 20 to 40 inches.

The Ap horizon ranges from dark brown (10YR 3/3) to brown (10YR 4/3) and contains as much as 20 percent coarse fragments.

The B horizon ranges from yellowish brown (10YR 5/6) to brown (7.5YR 4/4) and from silty clay loam to loam. The B and C horizons are strongly acid or medium acid.

The C horizon ranges from loam to clay loam. It contains 25 to 80 percent coarse fragments.

Culleoka soils are near Gilpin, Weikert, and moderately well drained Guernsey and Dormont soils. They are deeper than Weikert soils and are better drained than Guernsey and Dormont soils. They have a medium acid C horizon, which Gilpin soils lack.

CuB—Culleoka silt loam, 3 to 8 percent slopes. This gently sloping soil is generally in long areas on ridgetops or in long, narrow, contour areas on hillsides. It has the profile described as representative of the series. Slopes are slightly convex.

Included with this soil in mapping are small areas of Gilpin, Weikert, Dormont, and Guernsey soils and small areas of a similar soil that is more than 40 inches deep to bedrock. Also included are small areas of soils that have slopes of more than 8 percent and areas of soils that have a surface layer of shaly silt loam.

Runoff is slow to medium.

Moderate depth to bedrock, is a limitation for community development and recreation use. This soil is suited to all crops grown in the county. Conservation practices are needed to help control erosion. Capability unit IIe–2.

CuC—Culleoka silt loam, 8 to 15 percent slopes. This sloping soil is generally in long, narrow, contour areas on hillsides. It has a profile similar to the one described as representative of the series, but it is 2 to 4 inches shallower to the substratum. Slopes are slightly convex.

Included with this soil in mapping are small areas of Gilpin, Weikert, Dormont, and Guernsey soils and small areas of a similar soil that is more than 40 inches deep to bedrock. Also included are small areas of soils that have slopes of less than 8 percent or more than 15 percent, areas of soils that have a surface layer of shaly silt loam, and areas where the soils are eroded and their subsoil is exposed.

Runoff is medium.

Slope and moderate depth to bedrock are limitations for community development and recreation use. This soil is suited to crops grown in the county. Conservation practices are needed to help control erosion. Capability unit IIIe–2.

CuD—Culleoka silt loam, 15 to 25 percent slopes. This moderately steep soil is on uplands generally in long, narrow, contour areas on hillsides. It has a profile similar to the one described as representative of the series, but it is 2 to 4 inches shallower to the substratum. Slopes are convex.

Included with this soil in mapping are small areas of Gilpin, Weikert, Dormont, and Guernsey soils and small areas of soils that have slopes of less than 15 percent or more than 25 percent. Also included are areas where the soils are eroded and the subsoil is exposed and areas of soils that have a surface layer of shaly silt loam.

Runoff is medium.

Slope and moderate depth to bedrock are limitations for community development and recreation use. Slope is also a limitation for cultivated crops. Conservation practices are needed to help control erosion. Capability unit IVe–2.

CwB—Culleoka-Weikert shaly silt loams, 3 to 8 percent slopes. This gently sloping complex is generally on the crest of ridges or in long, narrow, contour areas on hillsides. Slopes are convex. The complex is about 50 percent Culleoka soils, 30 percent Weikert soils, and 20 percent other soils.

Included in mapping are small areas of a soil that has some characteristics of Culleoka and Weikert soils and small areas of Guernsey, Gilpin, and Dormont soils. Also included are small areas of soils that have slopes of more than 8 percent, areas of soils that have a surface layer of silt loam and loam, and areas where the soils are eroded and their subsoil is exposed.

Runoff is slow to medium.

Shallow to moderate depth to bedrock is a limitation for community development and recreation use. The soils in this complex are suited to most crops grown in the county, though the available water capacity is low. Conservation practices are needed to help control erosion. Capability unit IIIe–3.

CwC—Culleoka-Weikert shaly silt loams, 8 to 15 percent slopes. This sloping complex is generally in long, narrow, contour areas on hillsides. Slopes are convex. This complex is about 50 percent Culleoka soils, 30 percent Weikert soils, and 20 percent other soils. The Culleoka soil has a profile similar to the one described as representative of the Culleoka series, but the texture of the surface layer is shaly.

Included in mapping are small areas of a soil that has some characteristics of Culleoka and Weikert soils and small areas of Hazleton, Gilpin, and Dormont soils. Also included are small areas of soils that have slopes of less than 8 percent or more than 15 percent, soils that have a surface layer of silt loam or loam, and eroded soils that have their subsoil exposed.

Runoff is medium.

Shallow to moderate depth to bedrock and slope are limitations for community development and recreation use. The soils of this complex are suited to most crops grown in the county, though the available water capacity is low. Conservation practices are needed to help control erosion. Capability unit IVe–3.

CwD—Culleoka-Weikert shaly silt loams, 15 to 25 percent slopes. This moderately steep complex is generally in long, narrow, contour areas on hillsides. Slopes are convex. The complex is about 40 percent Culleoka soils, 35 percent Weikert soils, and 25 percent other soils. The Culleoka soil has a profile similar to the one described as representative of the Culleoka series, but the texture of the surface layer is shaly.

Included in mapping are small areas of a soil that has some characteristics of these Culleoka and Weikert soils and small areas of Hazleton, Gilpin, and Dormont soils. Also included are some small areas of soils that have slopes of less than 15 percent or more than 25 percent, soils that have a surface layer of silt loam or loam, and eroded soils that have their subsoil exposed.

Runoff is medium.

Shallow to moderate depth to bedrock and slope are limitations for community development and recreation use. The soils of this complex are generally not suited to cultivated crops but are suited to pasture, woodland, or wildlife habitat. Capability unit VIe–1.

Dormont Series

The Dormont series consists of deep, nearly level to steep, moderately well drained soils on uplands. These soils formed in material that weathered from nonacid shale, clay shale, and limestone.

In a representative profile the surface layer is about 7 inches thick. In the upper 3 inches it is very dark grayish-brown silt loam, and in the lower 4 inches it is brown silt loam. The subsoil is 46 inches thick. In the upper 5 inches it is brown, friable silt loam. In the 13 inches below that it is yellowish-brown, friable silt loam, in the next 23 inches it is mottled, pale-brown, firm silty clay loam, and in the lower 5 inches it is mottled, gray, firm silty clay loam. The substratum is mottled, gray silty clay.

Permeability is slow, and the available water capacity is high. In most years, the water table is at a depth of 1½ to 3 feet late in winter and early in spring.

Very steep fill areas that consist of material from these soils are subject to landslide.

The seasonal high water table, slow permeability, and slope in some areas are limitations for land use.

Representative profile of Dormont silt loam, 8 to 15 percent slopes, on the west side of Coal Valley Road, about 0.15 mile west of its intersection with Pennsylvania Route 51, in Jefferson Borough.

Ap1—0 to 3 inches, very dark grayish-brown (10YR 3/2) silt loam; weak, fine, granular structure; friable, slightly sticky and slightly plastic; many roots; strongly acid; clear, wavy boundary.

Ap2—3 to 7 inches, brown (10YR 4/3) silt loam; weak and moderate, fine, granular structure; friable; slightly sticky and slightly plastic; many roots; strongly acid; clear, wavy boundary.

B1—7 to 12 inches, brown (7.5YR 4/4) silt loam; moderate, fine, subangular blocky structure; friable, slightly sticky and slightly plastic; common roots; 5 percent coarse fragments; strongly acid; clear, wavy boundary.

B21t—12 to 25 inches, yellowish-brown (10YR 5/6) silt loam; moderate, medium, subangular blocky structure; friable, slightly sticky and slightly plastic; common roots; common thin clay films on faces of peds and in pores; 10 percent coarse fragments; strongly acid; clear, wavy boundary.

B22t—25 to 48 inches, pale-brown (10YR 6/3) silty clay loam; common, fine, distinct, dark grayish-brown (10YR 4/2) and reddish-yellow (7.5YR 6/8) mottles; moderate, medium, subangular blocky structure; firm, slightly sticky and plastic; common roots; many thin clay films on faces of peds and in root channels; 10 percent coarse fragments; strongly acid; clear, wavy boundary.

B3g—48 to 53 inches, gray (10YR 5/1) silty clay loam; many, fine and medium, distinct, yellowish-brown (10YR 5/6) mottles; moderate, medium and coarse, subangular blocky structure; firm, sticky and plastic; 10 percent coarse fragments; medium acid clear, wavy boundary.

Cg—53 to 72 inches, gray (10YR 5/1) silty clay; many, fine and medium, distinct, yellowish-brown (10YR 5/8) mottles; massive; firm, sticky and plastic; 10 percent coarse fragments; medium acid.

The solum is 36 to 60 inches thick. Bedrock is at a depth of more than 4 feet.

The Ap horizons, when mixed, range from dark grayish brown (10YR 4/2) to grayish brown (10YR 5/2).

The upper part of the Bt horizon ranges from yellowish brown (10YR 5/4) to dark yellowish brown (10YR 4/4) or strong brown (7.5YR 5/6) and is silt loam or silty clay loam. It contains as much as 15 percent coarse fragments. The lower part of the B horizon ranges from pale brown (10YR 6/3) to gray (N 5/0) and is mottled. It is silty clay loam or silty clay, and contains as much as 25 percent coarse fragments.

The C horizon ranges from silt loam to silty clay. It contains as much as 50 percent coarse fragments.

Dormont soils are near the moderately well drained Guernsey soils and well drained Culleoka soils, and they have a silt loam B21 horizon that Guernsey soils lack.

DoB—Dormont silt loam, 2 to 8 percent slopes. This nearly level and gently sloping soil is generally on ridgetops or in long, contour areas on hillsides. It has a profile similar to the one described as representative of the series, but it is 2 to 4 inches deeper to the substratum.

Included with this soil in mapping are small areas of Guernsey, Library, and Culleoka soils and small areas of soils that have slopes of more than 8 percent. A few areas of eroded soils are also included.

Runoff is medium.

A seasonal high water table and slow permeability are limitations for community development and recreation use. The hazard of erosion and the seasonal high water table are limitations for cultivated crops. Drainage increases the soil's suitability for crops. Conservation practices are needed to help control erosion. Capability unit IIe–3.

DoC—Dormont silt loam, 8 to 15 percent slopes. This sloping soil is generally on uplands in long, contour areas on hillsides. It has the profile described as representative of the series.

Included with this soil in mapping are small areas of Guernsey, Library, and Culleoka soils and small areas of soils that have shale or sandstone bedrock at a depth of 3 feet. Also included are small areas of soils that have slopes of less than 8 percent or more than 15 percent and a few areas of eroded soils.

Runoff is medium.

A seasonal high water table, slow permeability, and slope are limitations for community development and recreation use. The hazard of erosion and the seasonal high water table are limitations for cultivated crops. Drainage increases the soil's suitability for crops. Conservation practices are needed to help control erosion. Capability unit IIIe–4.

DoD—Dormont silt loam, 15 to 25 percent slopes. This moderately steep soil is generally in long, contour areas on hillsides. It has a profile similar to the one described as representative of the series, but it is 2 to 4 inches deeper to the substratum.

Included with this soil in mapping are small areas of Culleoka and Guernsey soils and small areas of soils that have shale or sandstone bedrock at a depth of about 3 feet. Also included are small areas of soils that have slopes of less than 15 percent or more than 25 percent and a few areas of severely eroded soils.

Runoff is rapid.

Slope, a seasonal high water table, and slow permeability are limitations for community development and recreation use. Slope and the seasonal high water table are limitations for cultivated crops. Draining the soil increases its suitability for crops. Conservation practices are needed to help control erosion. Capability unit IVe–4.

DoE—Dormont silt loam, 25 to 35 percent slopes. This steep soil is generally in long, contour areas on hillsides. It has a profile similar to the one described as representative of the series, but it is 3 to 5 inches shallower to the substratum.

Included with this soil in mapping are small areas of Culleoka, Weikert, and Guernsey soils and small areas of soils that have slopes of less than 25 percent.

Runoff is rapid.

Slope is a limitation for community development and recreation use. This soil is not suited to cultivated crops, but it is suited to pasture, woodland, or wildlife habitat. Capability unit VIe–2.

Dumps

This land type consists of areas where industrial wastes have been dumped. The wastes are mainly from coal mining and heavy manufacturing. There is little or no vegetation.

Figure 7.—An area of Dumps, coal wastes, to the left of an old mine tipple that once was a part of an underground coal mine operation.

Du—Dumps, coal wastes. These dumps are conical or long and narrow, steep piles of rock waste material that was piled near the opening of underground coal mines (fig. 7). Slopes are 25 to 100 percent. The top of some piles is nearly level.

The waste material is mixed coal, shale, and other rock. It is extremely acid and is subject to burning.

Included in mapping are areas where waste material has been burned to make red dog, an aggregate for surfacing secondary roads and driveways. Also included are areas where fly ash and rubbish have been dumped.

Runoff is rapid to very rapid.

Onsite investigation is required to determine the potential of these waste areas for any use. The waste material burns easily, consequently it is hazardous to use in construction. This land type is not suited to cultivated crops because of the toxic condition of the material. Vegetation is very difficult to establish. Not assigned to a capability unit.

Dw—Dumps, industrial wastes. These dumps are mounds or very steep piles of slag from steel manufacturing. Slopes are 0 to 85 percent. The top of some piles is nearly level.

The waste material is massive, crushed, or broken and relatively uniform in physical and chemical properties. It is neutral to mildly alkaline.

Included in mapping are areas where other kinds of industrial waste have been dumped.

Runoff is slow to very rapid.

Onsite investigation is required to determine the potential of these waste areas for land use. Accessible areas are a source of aggregate for use as earthfill, in the construction of highways and dams, and in the manufacture of cement blocks. The areas are not suited to cultivated crops or pasture. Vegetation is difficult to establish. Not assigned to a capability unit.

Ernest Series

The Ernest series consists of deep, nearly level to moderately steep, moderately well drained soils that have a fragipan. These soils are at the base of steeper upland slopes and near the head of some drainageways. They formed in colluvium that weathered from shale and sandstone.

In a representative profile the surface layer is about 6 inches thick. In the upper 4 inches it is very dark gray silt loam, and in the lower 2 inches it is yellowish-brown silt loam. The subsoil is 54 inches thick. In the upper 16 inches it is yellowish-brown, friable silt loam.

In the 6 inches below that it is mottled, yellowish-brown, firm silty clay loam. In the lower 32 inches, which is a fragipan, it is mottled, brown, very firm and brittle silt loam. The substratum is mottled, brown silt loam.

Permeability is slow, and the available water capacity is moderate. In most years the water table is at a depth of 1½ to 3 feet late in winter and early in spring.

The seasonal high water table, slow permeability, and slope in some areas are limitations for land use.

Representative profile of Ernest silt loam, 2 to 8 percent slopes, along the west side of Pennsylvania Route 856, 250 feet south of its intersection with Route T-428, in Marshall Township.

Ap1—0 to 4 inches, very dark gray (10YR 3/1) silt loam; moderate, fine, granular structure; very friable, nonsticky and nonplastic; many roots; slightly acid; abrupt, smooth boundary.

Ap2—4 to 6 inches, yellowish-brown (10YR 5/4) silt loam; weak, thin, platy structure; friable, nonsticky and nonplastic; many roots; strongly acid; abrupt, smooth boundary.

B1—6 to 16 inches, yellowish-brown (10YR 5/4) silt loam; weak, fine, subangular blocky structure; friable, slightly sticky and slightly plastic; many roots; very strongly acid; gradual, wavy boundary.

B21t—16 to 22 inches, yellowish-brown (10YR 5/4) silt loam; moderate, fine, subangular blocky structure; friable, slightly sticky and slightly plastic; many roots; thin discontinuous clay films; 5 percent coarse fragments; very strongly acid; gradual, wavy boundary.

B22t—22 to 28 inches, yellowish-brown (10YR 5/6) silty clay loam; few, fine, faint, grayish-brown (10YR 5/2) mottles; weak, coarse, prismatic structure parting to moderate, medium, angular blocky; firm, slightly sticky and slightly plastic; common roots; thin discontinuous yellowish-brown (10YR 5/4) clay films; 5 percent coarse fragments; very strongly acid; clear, wavy boundary.

Bx1—28 to 50 inches, brown (10YR 4/3) silt loam; common, fine, distinct, grayish-brown (10YR 5/2) and strong-brown (7.5YR 5/6) mottles; moderate, very coarse, prismatic structure parting to weak, medium, platy; very firm and brittle, slightly sticky and slightly plastic; few roots; medium, grayish-brown (2.5Y 5/2) clay films on prism faces; 10 percent coarse fragments; very strongly acid; gradual, wavy boundary.

Bx2—50 to 60 inches, brown (10YR 4/3) silt loam; many, medium, distinct, yellowish-brown (10YR 5/6) and light brownish-gray (10YR 6/2) mottles; weak, very coarse prismatic structures; very firm and brittle, slightly sticky and slightly plastic; many, fine, prominent, black (10YR 2/1) concretions; 10 percent coarse fragments; strongly acid; gradual, wavy boundary.

C—60 to 72 inches, brown (10YR 4/3) silt loam; many, medium, distinct, yellowish-brown (10YR 5/6) and light brownish-gray (10YR 6/2) mottles; massive; firm; 10 percent coarse fragments; strongly acid.

The solum is 40 to 60 or more inches thick. Bedrock is at a depth of more than 5 feet. Depth to the fragipan ranges from 20 to 30 inches.

The Ap horizons, when mixed, range from grayish brown (10YR 5/2) to dark brown (10YR 4/3).

The Bt horizon ranges from yellowish brown (10YR 5/6) to dark yellowish brown (10YR 4/4) and is silt loam or silty clay loam. Mottles that have chroma of 2 or less are within the upper 10 inches. This horizon contains 5 to 20 percent coarse fragments. The Bx horizon ranges from brown (10YR 4/3) to dark yellowish brown (10YR 4/4) and from silt loam to clay loam. It contains 5 to 20 percent coarse fragments.

Ernest soils are near the poorly drained Brinkerton soils and moderately well drained Vandergrift soils. They are better drained than Brinkerton soils and contain less clay in the B horizon than Vandergrift soils.

ErB—Ernest silt loam, 2 to 8 percent slopes. This nearly level and gently sloping soil is at the base of steeper upland slopes. It is generally in long, narrow areas adjacent to and parallel to flood plains of streams. It has the profile described as representative of the series. Slopes are concave.

Included with this soil in mapping are small areas of Brinkerton, Atkins, Wharton, and Vandergrift soils, and areas where the soils are eroded and the subsoil is exposed.

This soil receives runoff from adjacent, more sloping soils.

The seasonal high water table and slow permeability are limitations for community development and recreation use. The hazard of erosion, seasonal high water table, and the fragipan are limitations for cultivated crops. Drainage increases the suitability for crops. Conservation practices are needed to help control erosion. Capability unit IIe–3.

ErC—Ernest silt loam, 8 to 15 percent slopes. This sloping soil is near the base of steeper upland slopes or near the head of drainageways. It is generally in long, narrow areas adjacent to and parallel to flood plains of streams. It has a profile similar to the one described as representative of the series, but it is 2 to 4 inches shallower to the substratum. Slopes are concave.

Included with this soil in mapping are small areas of Atkins, Wharton, Vandergrift, and Gilpin soils and small areas of soils that have slopes of less than 8 percent or more than 15 percent. Also included are areas where the soils are eroded and the subsoil is exposed.

This soil receives runoff from adjacent, more sloping soils.

The seasonal high water table, slow permeability, and slope are limitations for community development and recreation use. The hazard of erosion, the seasonal high water table, and the fragipan are limitations for cultivated crops. Drainage increases the suitability for crops. Conservation practices are needed to help control erosion. Capability unit IIIe–4.

ErD—Ernest silt loam, 15 to 25 percent slopes. This moderately steep soil is at the base of steeper upland slopes or near the head of drainageways. It is generally in long, narrow areas adjacent to and parallel to flood plains of streams. This soil has a profile similar to the one described as representative of the series, but it is 2 to 4 inches shallower to the substratum.

Included with this soil in mapping are small areas of Atkins, Wharton, Vandergrift, and Gilpin soils and small areas of soils that have slopes of less than 15 percent or more than 25 percent. Also included are areas where the soils are eroded and the subsoil is exposed.

This soil receives runoff from adjacent, sloping soils.

The seasonal high water table, slow permeability, and slope are limitations for community development and recreation use. Slope and the seasonal high water table are limitations for cultivated crops. Conservation prac-

tices are needed to help control erosion. Capability unit IVe–4.

EvB—Ernest-Vandergrift silt loams, 3 to 8 percent slopes. This gently sloping complex is generally at the base of steeper upland slopes. Slopes are concave. The complex is about 50 percent Ernest soils, 30 percent Vandergrift soils, and 20 percent other soils.

Included in mapping are small areas of a soil that has some characteristics of the Ernest and Vandergrift soils and small areas of Brinkerton, Atkins, Guernsey, Gilpin, and Upshur soils. Also included are small areas of soils that have slopes of more than 8 percent.

This complex receives runoff from adjacent, sloping soils. Ground water seepage spots are in some areas.

The seasonal high water table, slow permeability, and susceptibility to landslide are limitations for community development and recreation use. The hazard of erosion and the seasonal high water table are limitations for cultivated crops. Drainage increases the suitability for crops. Conservation practices are needed to help control erosion. Capability unit IIe–3.

EvC—Ernest-Vandergrift silt loams, 8 to 15 percent slopes. This sloping complex is generally at the base of steeper upland slopes. Slopes are concave. The complex is about 50 percent Ernest soils, 30 percent Vandergrift soils, and 20 percent other soils.

Included in mapping are small areas of a soil that has some characteristics of the Ernest and Vandergrift soils and small areas of Atkins, Guernsey, Gilpin, and Upshur soils. Also included are small areas of soils that have slopes of less than 8 percent or more than 15 percent.

This complex receives runoff from adjacent, sloping soils. Ground water seepage spots are in some areas.

Slope, the seasonal high water table, slow permeability, and susceptibility to landslide are limitations for community development and recreation use. The hazard of erosion and the seasonal high water table are limitations for cultivated crops. Drainage increases the suitability for crops. Conservation practices are needed to help control erosion. Capability unit IIIe–4.

EvD—Ernest-Vandergrift silt loams, 15 to 25 percent slopes. This moderately steep complex is generally at the base of steeper upland slopes. Slopes are concave. The complex is about 60 percent Ernest soils, 20 percent Vandergrift soils, and 20 percent other soils.

Included in mapping are small areas of a soil that has some characteristics of the Ernest and Vandergrift soils and a few small areas of Atkins, Guernsey, Gilpin, and Upshur soils. Also included are small areas of soils that have slopes of less than 15 percent or more than 25 percent, and areas where small landslides are evident.

This complex receives runoff from adjacent, steeper soils. Ground water seepage spots are in some areas.

Slope and susceptibility to landslide are limitations for community development and recreation use. Slope and the seasonal high water table are limitations for cultivated crops. Conservation practices are needed to help control erosion. Capability unit IVe–4.

Gilpin Series

The Gilpin series consists of moderately deep, nearly level to very steep, well drained soils on uplands. These soils formed in material that weathered from shale and fine grained sandstone.

In a representative profile the surface layer is about 5 inches thick. It is very dark grayish-brown silt loam in the upper 2 inches and yellowish-brown silt loam in the lower 3 inches. The subsoil is yellowish-brown, friable shaly silt loam 18 inches thick. The substratum is yellowish-brown, friable very shaly loam. Shale bedrock is at a depth of 31 inches.

Permeability and the available water capacity are moderate.

Moderate depth to bedrock and slope are limitations for land use.

Representative profile of Gilpin silt loam, 8 to 15 percent slopes, along the north side of Route T725, 1/3 mile west of its intersection with Brush Creek Road, in Marshall Township. (Pennsylvania Department of Transportation engineering test data samples BP-23280 and BP-23281 were taken from this profile.)

Ap1—0 to 2 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, fine, granular structure; friable, nonsticky and nonplastic; many roots; 5 percent coarse fragments; strongly acid; clear, smooth boundary.

Ap2—2 to 5 inches, yellowish-brown (10YR 5/4) silt loam; moderate, fine, granular structure; friable, nonsticky and nonplastic; many roots; 10 percent coarse fragments; strongly acid; clear, smooth boundary.

B21t—5 to 14 inches, yellowish-brown (10YR 5/6) shaly silt loam; moderate, fine and medium, subangular blocky structure; friable, slightly sticky and slightly plastic; common roots; thin discontinuous clay films; 25 percent coarse fragments; strongly acid; gradual, smooth boundary.

B22t—14 to 23 inches, yellowish-brown (10YR 5/6) shaly silt loam; weak, medium, subangular blocky structure; friable, slightly sticky and slightly plastic; common roots; thin discontinuous clay films; 40 percent coarse fragments; strongly acid; clear, smooth boundary.

C—23 to 31 inches, yellowish-brown (10YR 5/6) very shaly loam; massive parting to horizontal shale bedrock structure; friable, nonsticky and nonplastic; few roots; 80 percent olive (5Y 5/4) coarse fragments; strongly acid; gradual, wavy boundary.

R—31 inches, olive (5Y 5/4) weathered and fractured shale.

The solum is 20 to 36 inches thick. The depth to bedrock ranges from 20 to 40 inches.

The A horizon contains 5 to 20 percent coarse fragments. The Ap horizons, when mixed, range from very dark grayish brown (10YR 3/2) to dark yellowish brown (10YR 4/4).

The B horizon is yellowish brown (10YR 5/4 or 5/6), and ranges from silty clay loam to loam. It contains 5 to 40 percent coarse fragments. The B and C horizons range from strongly acid to very strongly acid.

The C horizon is loam or silt loam. It contains 30 to 90 percent coarse fragments.

Gilpin soils are near Weikert, Hazleton, Upshur, Rayne, and Clymer soils. They are shallower to bedrock than Hazleton, Upshur, Rayne, and Clymer soils, and they are deeper than Weikert soils.

GlB—Gilpin silt loam, 2 to 8 percent slopes. This nearly level and gently sloping soil is generally in long areas on ridgetops or in long, narrow, contour areas on hillsides. It has a profile similar to the one described as representative of the series, but its surface layer is 1 to 3 inches thicker, and it is 2 to 4 inches deeper to bedrock. Slopes are slightly convex.

Included with this soil in mapping are small areas of Weikert, Culleoka, Rayne, Wharton, Clymer, and Upshur soils and small areas of soils that have slopes of

more than 8 percent. Also included are small areas of soils that have a surface layer of shaly silt loam.

Surface runoff is slow to medium.

The moderate depth to bedrock is a limitation for community development and recreation use. This soil is suited to all crops grown in the county. Conservation practices are needed to help control erosion. Capability unit IIe–2.

GlC—Gilpin silt loam, 8 to 15 percent slopes. This sloping soil is generally in long, narrow, contour areas on hillsides. It has the profile described as representative of the series. Slopes are convex.

Included with this soil in mapping are small areas of Weikert, Culleoka, Rayne, Clymer, and Upshur soils, small areas of soils that have slopes of less than 8 percent or more than 15 percent, and small areas of soils that have a surface layer of shaly silt loam. In some places, erosion has exposed the subsoil.

Runoff is medium.

Slope and moderate depth to bedrock are limitations for community development and recreation use. This soil is suited to all crops grown in the county. Conservation practices are needed to help control erosion. Capability unit IIIe–2.

GlD—Gilpin silt loam, 15 to 25 percent slopes. This moderately steep soil is generally in long, narrow, contour areas on hillsides. It has a profile similar to the one described as representative of the series, but it is 2 to 4 inches shallower to bedrock. Slopes are convex.

Included with this soil in mapping are small areas of Weikert, Culleoka, Hazleton, and Upshur soils, small areas of soils that have slopes of less than 15 percent or more than 25 percent, and small areas of soils that have a surface layer of shaly silt loam. Erosion has exposed the subsoil in some places.

Runoff is medium.

Slope and moderate depth to bedrock are limitations for community development and recreation use. Slope is also a limitation for cultivated crops. Conservation practices are needed to help control erosion. Capability unit IVe–2.

GpB—Gilpin-Upshur complex, 3 to 8 percent slopes. This gently sloping complex is generally in long areas on ridgetops or in long, narrow, contour areas on hillsides. It is about 50 percent Gilpin soils, 30 percent Upshur soils, and 20 percent other soils. The surface layer of the Gilpin soils is silt loam. In most places the surface layer of the Upshur soils is silty clay loam, but in some places it is silt loam.

Included in mapping are small areas of a soil that has some characteristics of the Gilpin and Upshur soils and small areas of Culleoka, Rayne, Vandergrift, Guernsey, and Weikert soils. Also included are small areas of soils that have slopes of more than 8 percent and areas where the soils are eroded and the subsoil is exposed.

Runoff is medium. Springs and ground water seepage spots are common on the hillsides.

Moderate depth to bedrock for the Gilpin part of the complex is a limitation for community development and recreation use. The soils in this complex are suited to all crops grown in the county. Drainage increases the suitability for crops in areas of ground water seepage spots. Conservation practices are needed to help control erosion. Capability unit IIIe–3.

GpC—Gilpin-Upshur complex, 8 to 15 percent slopes. This sloping complex is generally in long, narrow, contour areas on hillsides. It is about 50 percent Gilpin soils, 30 percent Upshur soils, and 20 percent other soils. The surface layer of the Gilpin soils is silt loam. In most places the surface layer of the Upshur soils is silty clay loam, but in some places it is silt loam.

Included in mapping are small areas of a soil that has some characteristics of the Gilpin and Upshur soils, small areas of Culleoka, Rayne, Vandergrift, Guernsey, and Weikert soils, and small areas of soils that have slopes of less than 8 percent or more than 15 percent. Erosion has exposed the subsoil in some places.

Runoff is medium. Springs and ground water seepage spots are common.

Susceptibility to landslide, slope, and the moderate depth to bedrock are limitations for community development and recreation use. The soils in this complex are suited to all crops grown in the county. Drainage increases the suitability for crops in areas of ground water seepage. Conservation practices are needed to help control erosion. Capability unit IVe–3.

GpD—Gilpin-Upshur complex, 15 to 25 percent slopes. This moderately steep complex is generally in long, narrow, contour areas on hillsides. It is about 50 percent Gilpin soils, 25 percent Upshur soils, and 25 percent other soils. The surface layer of the Gilpin soils is silt loam. In most places the surface layer of the Upshur soils is silty clay loam, but in some places it is silt loam.

Included in mapping are small areas of a soil that has some characteristics of the Gilpin and Upshur soils and small areas of Culleoka, Hazleton, Vandergrift, Guernsey, and Weikert soils. Also included are small areas of soils that have slopes of less than 15 percent or more than 25 percent, areas of soils that have a surface layer of shaly silt loam, and areas where erosion has exposed the subsoil.

Runoff is rapid. Springs and ground water seepage spots are common.

Susceptibility to landslide, moderate depth to bedrock, and slope are limitations for community development and recreation use. The soils in this complex are not suited to cultivated crops because of their slope. They are generally suited to pasture, woodland, and wildlife habitat. Capability unit VIe–1.

GQF—Gilpin-Upshur complex, very steep. This complex generally is on valley sides that parallel the streams. Slopes are 25 to 80 percent. The composition of this mapping unit is more variable and areas are generally much larger than those of most other mapping units in the county. But mapping is adequate for the anticipated uses of the soils. The complex is about 50 percent Gilpin soils, 15 percent Upshur soils, and 35 percent other soils.

The surface layer of the Gilpin soils is silt loam. In most places the surface layer of the Upshur soils is silty clay loam, but in some places it is silt loam.

Included in mapping are small areas of a soil that has some characteristics of the Gilpin and Upshur soils and small areas of Culleoka, Hazleton, Vandergrift, Guernsey, and Weikert soils. Also included are small

areas of soils that have slopes of less than 25 percent and areas of soils that have a surface layer of shaly silt loam.

Runoff is rapid to very rapid. Springs and ground water seepage spots are common.

Susceptibility to landslide (fig. 8) and slope are limitations for community development and recreation use. The soils in this complex are not suited to cultivated crops because of their slope. They are suited to woodland and wildlife habitat. Capability unit VIIe–1.

GrE—Gilpin-Vandergrift silt loams, slumped, 15 to 35 percent slopes. This moderately steep and steep complex is on the lower part of valley sides. It is about 40 percent Gilpin soils, 40 percent Vandergrift soils, and 20 percent other soils.

Areas of this complex have an uneven, convex-concave surface that forms large steps or benches 10 to 40 feet across (fig. 9). Cracks as much as 1 foot wide are evident on the upper side of the slumps.

Included in mapping are small areas of Upshur, Guernsey, Ernest, and Weikert soils and areas of soils that have slopes of less than 15 percent or more than 35 percent. Also included are areas of soils that have a surface layer of shaly silt loam.

Runoff is mostly moderate to rapid. Some surface water enters the cracks. Springs and ground water seepage spots are common.

The soils in this complex have limitations for most uses because of landslides, moderate depth to bedrock, and slope. They are suited to woodland and wildlife habitat. Capability unit VIIe–2.

GSF—Gilpin, Weikert, and Culleoka shaly silt loams, very steep. This mapping unit is generally in long, narrow, contour areas on valley sides that parallel the streams. Slopes are convex and are 25 to 80 percent.

Figure 8.—**A landslide in an area of Gilpin-Upshur complex has damaged this road.**

The composition of this mapping unit is more variable and areas are generally much larger than those of most other mapping units in the county. But mapping is adequate for the anticipated uses of the soils. In the northern part of Allegheny County, areas of this mapping unit are about 50 percent Gilpin soils, 25 percent Weikert soils, and 25 percent other soils. In the southern part of the county, the areas are about 40 percent Culleoka soils, 35 percent Weikert soils, and 25 percent other soils.

The Weikert soils in this mapping unit have the profile described as representative of the Weikert series.

Included in mapping are small areas of soils that have some characteristics of the Gilpin, Weikert, and Culleoka soils and a few areas of Hazleton, Wharton, and Dormont soils. Also included are small areas of soils that have slopes of less than 25 percent, a few areas where the soils are eroded and the subsoil is exposed, and scattered bedrock ledges.

Surface runoff is rapid to very rapid.

The soils in this mapping unit have limitations for community development and recreation use because of their depth to bedrock and slope. They are not suited to cultivated crops because of their slope. These soils are suited to woodland and wildlife habitat. Capability unit VIIe–1.

Guernsey Series

The Guernsey series consists of deep, nearly level to moderately steep, moderately well drained soils on uplands. These soils formed in material that weathered from nonacid clay shale and limestone.

In a representative profile the surface layer is about 7 inches thick. It is very dark brown silt loam in the upper 3 inches and very dark grayish-brown silt loam in the lower 4 inches. The subsoil is 31 inches thick. In the upper 4 inches it is yellowish-brown, firm silty clay loam. In the 9 inches below that it is yellowish-brown, firm silty clay. In the next 7 inches it is mottled, yellowish-brown, firm silty clay. Below this is 7 inches of mottled, light olive-brown, firm clay. The lower 4 inches is mottled, light olive-brown, firm silty clay. The substratum is olive-brown, very firm shaly silt loam.

Permeability is slow, and the available water capacity is moderate. In most years the water table is at a depth of 1 to 2 feet late in winter and early in spring. Very steep fill slopes are susceptible to landslide.

The seasonal high water table, slow permeability, and slope in some areas are limitations for land use.

Representative profile of Guernsey silt loam, 8 to 15 percent slopes, in a woods, on the south side of a dirt road about ¾ mile west-southwest of the intersection of U.S. Highway 19 and Route 02046, in Upper St. Clair Township. (Pennsylvania Department of Transportation engineering test data samples BP-23288 and BP-23289 were taken from this profile.)

A11—0 to 3 inches, very dark brown (10YR 2/2) silt loam, light brownish-gray (10YR 6/2), when dry; moderate, medium and fine, granular structure; friable, slightly sticky and slightly plastic; many roots; 3 percent coarse fragments; medium acid; abrupt, smooth boundary.

Figure 9.—**The uneven, convex-concave surface is characteristic of Gilpin-Vandergrift silt loams, slumped, 15 to 35 percent slopes.**

A12—3 to 7 inches, very dark grayish-brown (10YR 3/2) silt loam, light brownish-gray (10YR 6/2) when dry; weak, thin and medium, platy structure; friable, slightly sticky and slightly plastic; many roots; 4 percent coarse fragments; medium acid; abrupt, wavy boundary.

B1—7 to 11 inches, yellowish-brown (10YR 5/6) silty clay loam; moderate, medium, angular blocky structure; firm, slightly sticky and slightly plastic; common roots; discontinuous, clay films; 3 percent coarse fragments; medium acid; clear, wavy boundary.

B21t—11 to 20 inches, yellowish-brown (10YR 5/6) silty clay; moderate, medium, angular blocky structure; firm, sticky and plastic; few roots; thin continuous clay films; 15 percent coarse fragments; medium acid; clear, wavy boundary.

B22t—20 to 27 inches, yellowish-brown (10YR 5/4) silty clay; many, fine, faint, light brownish-gray (10YR 6/2) and yellowish-brown (10YR 5/6 and 5/8) mottles; moderate, medium, angular blocky structure; firm, sticky and plastic; few roots; thin continuous clay films; 3 percent coarse fragments; medium acid; clear, wavy boundary.

B23t—27 to 34 inches, light olive-brown (2.5Y 5/4) clay; many, medium, distinct, light brownish-gray (2.5Y 6/2) and yellowish-brown (10YR 5/6) mottles; moderate, medium and coarse, angular blocky structure; firm, sticky and very plastic; few roots; thin continuous clay films; 10 percent coarse fragments; medium acid; abrupt, smooth boundary.

B3t—34 to 38 inches, light olive-brown (2.5Y 5/4) silty clay; abundant, coarse, prominent strong-brown (7.5YR 5/6 and 5/8) mottles; weak, coarse, angular blocky structure; firm, sticky and plastic; thin discontinuous clay films; 5 percent coarse fragments; slightly acid; abrupt, smooth boundary.

C—38 to 50 inches, olive-brown (2.5Y 4/4) shaly silt loam; massive structure parting to platy rock; very firm, slightly sticky and slightly plastic; 30 percent coarse fragments; slightly acid.

The solum is 36 to 48 inches thick. Bedrock is at a depth of more than 4 feet.

The A horizons, when mixed, range from very dark grayish brown (10YR 3/2) to dark brown (10YR 3/3).

The upper part of the B horizon ranges from strong brown (7.5YR 5/6) to yellowish brown (10YR 5/4). The lower part ranges from yellowish brown (10YR 5/4) to grayish brown (2.5Y 5/2). Low chroma mottles are within the upper 10 inches of the Bt horizon. The B horizon contains as much as 15 percent coarse fragments. The lower part of the B and C horizons are medium acid or neutral.

The C horizon ranges from shaly silt loam to clay.

Guernsey soils are near the somewhat poorly drained Library soils and the moderately well drained Dormont and Vandergrift soils. They are better drained than Library soils, they contain more clay in the B21t horizon than Dormont soils, and they lack the reddish B horizon of the Vandergrift soils.

GuB—Guernsey silt loam, 2 to 8 percent slopes. This nearly level and gently sloping soil is generally in long areas on ridgetops or in long, contour areas on hillsides. It has a profile similar to the one described as repre-

sentative of the series, but it is 2 to 4 inches deeper to the substratum.

Included with this soil in mapping are small areas of Library, Dormont, and Culleoka soils and small areas of soils that have slopes of more than 8 percent. Also included are small areas of soils that have a surface layer of eroded silty clay loam.

Runoff is medium.

The seasonal high water table and slow permeability are limitations for community development and recreation use. The hazard of erosion and the seasonal high water table are limitations for cultivated crops. Drainage increases the suitability for crops. Conservation practices are needed to help control erosion. Capability unit IIe–3.

GuC—Guernsey silt loam, 8 to 15 percent slopes. This sloping soil is generally in long, contour areas on hillsides. It has the profile described as representative of the series.

Included with this soil in mapping are small areas of Dormont, Library, and Culleoka soils and small areas of soils that have slopes of less than 8 percent or more than 15 percent. Also included are small areas of soils that have a surface layer of eroded silty clay loam.

Runoff is medium.

The seasonal high water table, slow permeability, and slope are limitations for community development and recreation use. The hazard of erosion and the seasonal high water table are limitations for cultivated crops. Drainage increases the suitability for crops. Conservation practices are needed to help control erosion. Capability unit IIIe–4.

GuD—Guernsey silt loam, 15 to 25 percent slopes. This moderately steep soil is generally in long, contour areas on hillsides. It has a profile similar to the one described as representative of the series, but it is 1 to 2 inches thinner to the substratum.

Included with this soil in mapping are small areas of Dormont, Culleoka, and Library soils and small areas of soils that have slopes of less than 15 percent or more than 25 percent. Also included are a few areas of soils that have a surface layer of eroded silty clay loam.

Runoff is medium.

Steep slopes are a limitation for community development and recreation use. Slope and the seasonal high water table are limitations for cultivated crops. Drainage increases the suitability for crops. Conservation practices are needed to help control erosion. Capability unit IVe–4.

GvB—Guernsey-Vandergrift silt loams, 3 to 8 percent slopes. This gently sloping complex is generally in long areas on ridgetops or in long, narrow, contour areas on hillsides. It is about 50 percent Guernsey soils, 30 percent Vandergrift soils, and 20 percent other soils. The Vandergrift soil has the profile described as representative of the Vandergrift series.

Included in mapping are small areas of Dormont, Upshur, Gilpin, and Wharton soils and small areas of soils that have a surface layer of silty clay loam. Also included are small areas of soils that have slopes of more than 8 percent.

Runoff is medium. Springs and ground water seepage spots are common on the hillsides.

The seasonal high water table and slow permeability are limitations for community development and recreation use. The hazard of erosion and the seasonal high water table are limitations for cultivated crops. Drainage increases the suitability for crops. Conservation practices are needed to help control erosion. Capability unit IIe–3.

GvC—Guernsey-Vandergrift silt loams, 8 to 15 percent slopes. This sloping complex is generally in long, narrow, contour areas on hillsides. It is about 50 percent Guernsey soils, 30 percent Vandergrift soils, and 20 percent other soils.

Included in mapping are small areas of Dormont, Upshur, Gilpin, and Wharton soils and small areas of soils that have a surface layer of silty clay loam. Also included are small areas of soils that have slopes of less than 8 percent or more than 15 percent.

Runoff is medium. Springs and ground water seepage spots are common.

Slope, the susceptibility to landslide, the seasonal high water table, and slow permeability are limitations for community development and recreation use. The hazard of erosion and the seasonal high water table are limitations for cultivated crops. Drainage increases the suitability for crops. Conservation practices are needed to help control erosion. Capability unit IIIe–4.

GvD—Guernsey-Vandergrift silt loams, 15 to 25 percent slopes. This moderately complex unit is generally in long, narrow, contour areas on hillsides. It is about 50 percent Guernsey soils, 30 percent Vandergrift soils, and 20 percent other soils.

Included in mapping are small areas of Dormont, Upshur, Gilpin, and Wharton soils and small areas of soils that have a surface layer of silty clay loam. Also included are small areas of soils that have slopes of less than 15 percent or more than 25 percent.

Runoff is rapid. Springs and ground water seepage spots are common.

Slope, the susceptibility to landslide, the seasonal high water table, and slow permeability are limitations for community development and recreation use. Slope and the seasonal high water table are limitations for cultivated crops. Drainage increases the suitability for crops. Conservation practices are needed to help control erosion. Capability unit IVe–4.

Gullied Land

This land type is in sloping to steep areas on uplands. It consists of closely spaced gullies formed by severe erosion. The original vegetation was destroyed by toxic air pollutants.

In a representative area of Gullied land, the gullies are very steep sided, V-shaped, and 1 to 10 feet deep. The gullies are generally adjacent to one another. Little of the original soil remains. The surface has a mixed shaly, channery, and rocky pavement. The exposed material is similar to the substrata and bedrock of the Culleoka, Dormont, and Guernsey soils. There is little or no living vegetation.

Gx—Gullied land. In this mapping unit slopes and soil materials vary greatly within short distances. Slopes are 8 to 35 percent.

Included with this land type in mapping are small areas of Culleoka, Dormont, and Guernsey soils.

Surface runoff is very rapid. Areas of this land type are variable. Detailed onsite investigation is required to determine kinds and degrees of limitations for land use. Not assigned to a capability unit.

Hazleton Series

The Hazleton series consists of deep, gently sloping to very steep, well drained soils on uplands. These soils formed in material that weathered from sandstone bedrock.

In a representative profile the surface layer is dark-brown loam about 6 inches thick. The subsoil is 22 inches thick. In the upper 3 inches it is yellowish-brown, friable channery sandy loam. In the 8 inches below that it is yellowish-brown, very friable channery sandy loam. In the lower 11 inches it is yellowish-brown, loose channery sandy loam. The substratum is olive-brown, loose, very channery loamy sand. Sandstone bedrock is below a depth of 60 inches.

Permeability is moderately rapid, and the available water capacity is low.

Slope is a limitation for land use.

Representative profile of Hazleton loam, 15 to 25 percent slopes, in an idle area, 600 feet north of Route 02045, 2/10 mile west of its intersection with Route 02133, in Marshall Township. (Pennsylvania Department of Transportation engineering test data samples BP-32662 and BP-32663 were taken from this profile.)

Ap—0 to 6 inches, dark-brown (10YR 4/3) loam; weak to moderate, fine and medium, granular structure; very friable, nonsticky and nonplastic; many roots; 10 percent coarse fragments; strongly acid; abrupt, wavy boundary.

B21—6 to 9 inches, yellowish-brown (10YR 5/4) channery sandy loam; moderate, medium, subangular blocky structure; friable, slightly sticky and nonplastic; few roots; 20 percent coarse fragments; strongly acid; clear, wavy boundary.

B22—9 to 17 inches, yellowish-brown (10YR 5/4) channery sandy loam; weak, medium and coarse, subangular blocky structure; very friable, nonsticky and nonplastic; few roots; clay bridges some sand grains; 40 percent coarse fragments; strongly acid; gradual, wavy boundary.

B3—17 to 28 inches, yellowish-brown (10YR 5/4) channery sandy loam; weak, coarse, subangular blocky structure; loose, nonsticky and nonplastic; few roots; some clay bridging of sand grains; 40 percent coarse fragments; strongly acid; gradual, wavy boundary.

C—28 to 60 inches, olive-brown (2.5Y 4/4) very channery loamy sand; single grained; loose, nonsticky and nonplastic; 60 percent coarse fragments; strongly acid; diffuse, wavy boundary.

R—60 to 66 inches, olive-brown (2.5Y 4/4) weathered and fractured sandstone.

The solum is 25 to 40 inches thick. The depth to bedrock ranges from 3½ to 6 feet.

The Ap horizon ranges from dark brown (10YR 3/3) to brown (10YR 4/3) and contains as much as 15 percent coarse fragments.

The B horizon ranges from yellowish brown (10YR 5/6) to dark yellowish brown (10YR 4/4). It ranges from loam to sandy loam in the upper part and from sandy loam to loamy sand in the lower part. This horizon contains 20 to 60 percent coarse fragments. The B and C horizons are strongly acid or very strongly acid.

The C horizon ranges from sandy loam to loamy sand. It contains 40 to 70 percent coarse fragments.

Hazleton soils are near Gilpin and Clymer soils. They are deeper than Gilpin soils, and they contain less clay in the B horizon than Clymer soils.

HaB—Hazleton loam, 3 to 8 percent slopes. This gently sloping soil is generally in long areas on ridgetops or in long, narrow, contour areas on hillsides. It has a profile similar to the one described as representative of the series, but it is 2 to 4 inches deeper to the substratum. Slopes are convex.

Included with this soil in mapping are small areas of Clymer and Gilpin soils and areas of soils that have a surface layer of sandy loam. Also included are small areas of soils that have slopes of more than 8 percent.

Surface runoff is slow to medium.

In places the depth to bedrock is a limitation for community development. This soil is suited to all crops grown in the county. Conservation practices are needed to help control erosion. Capability unit IIe–1.

HaC—Hazleton loam, 8 to 15 percent slopes. This sloping soil is generally in long, narrow, contour areas on hillsides. It has a profile similar to the one described as representative of the series, but it is 2 to 4 inches deeper to the substratum. Slopes are convex.

Included with this soil in mapping are small areas of Clymer, Gilpin, and Weikert soils and small areas of soils that have slopes of less than 8 percent or more than 15 percent. Also included are soils that have a surface layer of sandy loam.

Runoff is medium.

Slope is a limitation for community development and recreation use. This soil is suited to all crops grown in the county. Conservation practices are needed to help control erosion. Capability unit IIIe–1.

HaD—Hazleton loam, 15 to 25 percent slopes. This moderately steep soil is generally in long, narrow, contour areas on hillsides. It has the profile described as representative of the series. Slopes are convex.

Included with this soil in mapping are small areas of Clymer, Gilpin, and Weikert soils and small areas of soils that have slopes of less than 15 percent or more than 25 percent. Also included are small areas of soils that have a surface layer of sandy loam.

Runoff is medium.

Slope is a limitation for community development and recreation use. Slope is also a limitation for cultivated crops. Conservation practices are needed to help control erosion. Capability unit IVe–1.

HTE—Hazleton loam, steep. This steep and very steep soil is generally in long, narrow, contour areas on hillsides. It has a profile similar to the one described as representative of the series, but it is 2 to 3 inches less deep to the substratum. Slopes are 25 to 45 percent. The composition of this mapping unit is more variable and areas are generally much larger than those of most other units in the county. Mapping is adequate, however, for the anticipated uses of the soils.

Included with this soil in mapping are small areas of Weikert, Gilpin, and Clymer soils and some bedrock ledges. Also included are soils that have a surface layer of sandy loam and that have as much as 30 percent coarse fragments on the surface, and a few small areas of soils that have slopes of less than 25 percent.

Runoff is rapid to very rapid.

Slope is a limitation for community development and recreation use. It is also a limitation that makes this soil unsuitable for cultivated crops. The soil is suited to woodland and wildlife habitat. Capability unit VIIe–1.

Huntington Series

The Huntington series consists of deep, nearly level, well-drained soils on flood plains adjacent to streams. These soils formed in relatively recent alluvium.

In a representative profile the surface layer is about 20 inches thick. It is very dark brown silt loam in the upper 14 inches and dark brown silt loam in the lower 6 inches. The subsoil is 28 inches thick. In the upper 6 inches it is brown, friable silt loam. In the 10 inches below this it is dark yellowish-brown, friable silt loam. In the lower 12 inches, it is dark yellowish-brown, very friable silt loam. The substratum is dark yellowish-brown sandy loam.

Permeability is moderate, and the available water capacity is high.

The hazard of flooding is a limitation for land use.

Representative profile of Huntington silt loam, in an idle field on the Chartiers Creek flood plain, about ¼ mile west of Lincoln Street, in Crafton Borough.

Ap—0 to 8 inches, very dark brown (10YR 2/2) silt loam; grayish-brown (10YR 5/2) when dry; moderate, medium, granular structure; friable, slightly sticky and slightly plastic; many roots; neutral, clear, smooth boundary.

A1—8 to 14 inches, very dark brown (10YR 2/2) silt loam; grayish-brown (10YR 5/2) when dry; weak, fine, subangular blocky structure; friable, slightly sticky and slightly plastic; many roots; neutral; clear, wavy boundary.

A3—14 to 20 inches, dark brown (10YR 3/3) silt loam; moderate, fine and medium, subangular blocky structure; friable, slightly sticky and slightly plastic; common roots; slightly acid; clear, wavy boundary.

B1—20 to 26 inches, brown (10YR 4/3) silt loam; moderate, fine and medium, subangular blocky structure; friable, slightly sticky and nonplastic; common roots; medium acid; clear, wavy boundary.

B2—26 to 36 inches, dark yellowish-brown (10YR 4/4) silt loam; moderate, medium, subangular blocky structure; friable, nonsticky and nonplastic; common roots; medium acid; clear, wavy boundary.

B3—36 to 48 inches, dark yellowish-brown (10YR 4/4) silt loam; weak, coarse, subangular blocky structure; very friable; nonsticky and nonplastic; few roots; slightly acid; clear, wavy boundary.

IIC—48 to 60 inches, dark yellowish-brown (10YR 4/4) sandy loam; massive; very friable, nonsticky and nonplastic; slightly acid.

The solum is 40 to 60 inches thick. Bedrock is at a depth of more than 5 feet.

The A horizon is 10 to 24 inches thick. It ranges from very dark brown (10YR 2/2) to dark brown (10YR 3/3).

The B horizon ranges from dark brown (10YR 4/3) to yellowish brown (10YR 5/4) and from silt loam to silty clay loam.

The C horizon ranges from dark brown (10YR 4/3) to yellowish brown (10YR 5/4) and from sandy loam to loam. It contains some gravel lenses.

Huntington soils are near the somewhat poorly drained to poorly drained Newark soils and the moderately well drained Lindside soils. They are better drained than those soils.

Hu—Huntington silt loam. This nearly level soil is on flood plains adjacent to intermittent and perennial streams. Slopes are 0 to 3 percent.

Included with this soil in mapping are small areas of Lindside and Newark soils and some areas that have sand and gravel within a depth of 3 feet. Also included are small areas of soils that have a very shaly or very channery profile and some soils that have a surface layer that is less thick and less dark than is typical.

This soil receives runoff from adjacent, more sloping soils. It is also subject to flooding.

Flooding is a limitation for community development and recreation use. This soil is well suited to most crops grown in the county, but flooding is a limitation for crops in some areas. This soil is generally not suited to orchards because of poor air drainage. Capability unit I–1.

Library Series

The Library series consists of deep, gently sloping to moderately steep, somewhat poorly drained soils on uplands. These soils formed in material that weathered from limestone and clay shale bedrock.

In a representative profile the surface layer is dark grayish-brown silty clay loam about 8 inches thick. The subsoil is 17 inches thick. In the upper 5 inches it is mottled, brown, firm silty clay. In the 6 inches below that it is mottled, grayish-brown, firm silty clay. In the lower 6 inches it is mottled, olive-gray, very firm silty clay. The substratum is mottled, olive-gray and dark yellowish-brown shaly silty clay loam and shaly loam.

Permeability is slow, and the available water capacity is moderate. In most years the water table is at a depth of ½ to 1½ feet late in winter and early in spring. Very steep fill slopes are susceptible to landslide.

Slow permeability, the seasonal high water table, and slope in some areas are limitations to land use.

Representative profile of Library silty clay loam, 3 to 8 percent slopes, in a field, 600 feet northeast of Route 02033, 3/10 mile north of its intersection with Route T362 and 120 feet southeast of telephone pole No. 5/35, in North Fayette Township. (Pennsylvania Department of Transportation engineering test data samples BP-23286 and BP-23287 were taken from this profile.)

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silty clay loam; weak, fine, granular structure; friable, nonsticky and slightly plastic; many roots; less than 5 percent coarse fragments; slightly acid; abrupt, smooth boundary.

B21t—8 to 13 inches, brown (7.5YR 5/4) silty clay; brown (10YR 5/3) and grayish-brown (10YR 5/2) ped faces; strong, medium, blocky structure; firm, sticky and plastic; common roots; thin continuous clay films; 10 percent coarse fragments; very strongly acid; clear, wavy boundary.

B22tg—13 to 19 inches, grayish-brown (10YR 5/2) silty clay; many, fine, distinct, grayish-brown (2.5Y 5/2), olive (5Y 5/4), and dark brown (7.5YR 4/4) mottles; moderate, medium, prismatic structure parting to strong, medium and coarse, blocky; firm, sticky and plastic; few roots; thick continuous clay films; less than 5 percent coarse fragments; very strongly acid; clear, wavy boundary.

B23tg—19 to 25 inches, olive-gray (5Y 5/2) silty clay; many, fine, distinct, olive-brown (2.5Y 4/4) and gray (N 5/0) mottles; moderate, coarse and me-

dium, prismatic structure parting to strong, coarse, blocky; very firm, sticky and plastic; thick continuous clay films; less than 5 percent coarse fragments; very strongly acid; abrupt, wavy boundary.

C1g—25 to 41 inches, olive-gray (5Y 4/2) shaly silty clay loam; many, distinct, gray (5Y 5/1), light olive-brown (2.5Y 5/4), and yellowish-brown (10YR 5/6) mottles; moderate, thin and medium, platy structure; very firm, sticky and plastic; common thick clay films; thin black irregular bands of coal; 30 percent coarse fragments; strongly acid; abrupt, irregular boundary.

C2—41 to 54 inches, dark yellowish-brown (10YR 4/4) and strong-brown (7.5YR 5/6) shaly loam; olive-brown (2.5Y 4/4) and grayish-brown (2.5Y 5/2) streaks; weak, medium, platy structure; very firm, slightly sticky and plastic; 40 percent fragments; neutral.

The solum is 20 to 40 inches thick. Bedrock is at a depth of 3½ to 6 feet.

The Ap horizon ranges from very dark grayish brown (10YR 3/2) to dark brown (10YR 4/3).

The B horizon ranges from gray (10YR 6/1) to brown (7.5YR 5/4) and is mottled throughout. It ranges from silty clay to clay. The upper part of the B horizon is medium acid to very strongly acid. The lower part of the B and C horizons is very strongly acid to neutral.

The C horizon ranges from olive gray (5Y 4/2) to light yellowish brown (10YR 6/4) and from shaly loam to silty clay.

Library soils are near the moderately well drained Guernsey and Dormont soils. Library soils are wetter than those soils.

LbB—Library silty clay loam, 3 to 8 percent slopes. This gently sloping soil is generally in long, contour areas on hillsides. It has the profile described as representative of the series. Slopes are concave.

Included with this soil in mapping are small areas of Dormont and Guernsey soils and soils that are poorly drained. Also included are some areas where the soils are eroded and the silty clay subsoil is exposed and small areas of soils that have a surface layer of silt loam.

Runoff is medium.

A seasonal high water table and slow permeability are limitations for community development and recreation use. The seasonal high water table is a limitation for cultivated crops. Drainage increases the soil's suitability for crops. Conservation practices are needed to help control erosion. Capability unit IIIw–2.

LbC—Library silty clay loam, 8 to 15 percent slopes. This sloping soil is generally in long, contour areas on hillsides. It has a profile similar to the one described as representative of the series, but it is 2 to 4 inches less deep to the substratum. Slopes are concave.

Included with this soil in mapping are small areas of Dormont, Guernsey, and Culleoka soils and a few areas where erosion has exposed the silty clay subsoil. Also included are small areas of soils that have slopes of less than 8 percent or more than 15 percent and small areas of soils that have a surface layer of silt loam.

Runoff is medium.

A seasonal high water table, slow permeability, and slope are limitations for community development and recreation use. The hazard of erosion and the seasonal high water table are limitations for cultivated crops. Drainage increases the soil's suitability for crops. Conservation practices are needed to help control erosion. Capability unit IIIe–5.

LbD—Library silty clay loam, 15 to 25 percent slopes. This moderately steep soil is generally in long, narrow, contour areas on hillsides. It has a profile similar to the one described as representative of the series, but it is 2 to 4 inches less deep to the substratum. Slopes are concave.

Included with this soil in mapping are small areas of Dormont, Guernsey, and Culleoka soils and small areas of soils that have slopes of less than 15 percent or more than 25 percent. Also included are some areas where erosion has exposed the silty clay subsoil and small areas of soils that have a surface layer of silt loam.

Runoff is rapid.

Steep slopes, the seasonal high water table, and slow permeability are limitations for community development and recreation use. Steep slopes and the seasonal high water table are limitations for cultivated crops. Drainage increases the suitability for crops. Conservation practices are needed to help control erosion. Capability unit IVe–5.

Lindside Series

The Lindside series consists of deep, nearly level, moderately well drained soils on flood plains adjacent to or near streams. These soils formed in relatively recent alluvium.

In a representative profile the surface layer is very dark grayish-brown silt loam about 8 inches thick. The subsoil is 30 inches thick. In the upper 14 inches it is brown, friable silt loam. In the 10 inches below that it is mottled, brown, friable silt loam. In the lower 6 inches it is mottled, olive-brown, friable silt loam. The substratum is mottled, dark grayish-brown loam.

Permeability is moderate, and the available water capacity is high. In most years the water table is at a depth of 1½ to 3 feet late in winter and early in spring.

The seasonal high water table and the hazard of flooding are limitations for land use.

Representative profile of Lindside silt loam, midway between stream and Route 02246 at utility pole No. 377, ¼ mile southwest of the intersection of Route 02246 with Route 396, in North Fayette Township.

Ap—0 to 8 inches, very dark grayish-brown (10YR 3/2) silt loam; light brownish-gray (10YR 6/2) when dry; weak, fine, granular structure; friable, nonsticky and slightly plastic; many roots; neutral; clear, wavy boundary.

B1—8 to 12 inches, brown (10YR 4/3) silt loam; weak, fine and medium, subangular blocky structure; friable, slightly sticky and slightly plastic; many roots; slightly acid; clear, wavy boundary.

B21—12 to 22 inches, brown (7.5YR 4/4) silt loam; moderate, medium, subangular blocky structure; friable, slightly sticky and slightly plastic; common roots; slightly acid; clear, wavy boundary.

B22—22 to 32 inches, brown (10YR 4/3) silt loam; few, fine, faint, dark grayish-brown (10YR 4/2) mottles; weak, medium, subangular blocky structure; friable, slightly sticky and slightly plastic; common roots; neutral, clear, wavy boundary.

B3—32 to 38 inches, olive-brown (2.5Y 4/4) silt loam; common, medium, distinct, grayish-brown (2.5Y 5/2) and dark yellowish-brown (10YR 4/4) mottles; weak, coarse, angular blocky structure; friable, slightly sticky and slightly plastic; few roots; neutral; clear, wavy boundary.

Cg—38 to 60 inches, dark grayish-brown (2.5Y 4/2) loam; common, medium, distinct, yellowish-brown (10YR

5/6) and dark gray (10YR 4/1) mottles; massive; firm, nonsticky and nonplastic; neutral.

The solum is 30 to 40 inches thick. Bedrock is at a depth of more than 5 feet.

The A horizon ranges from very dark grayish brown (10YR 3/2) to dark brown (10YR 4/3). This horizon contains as much as 5 percent coarse fragments.

The B horizon is mottled above a depth of 24 inches. It ranges from silty clay loam to silt loam and contains as much as 5 percent coarse fragments. The B and C horizons are medium acid to neutral.

The C horizon is dark grayish brown (2.5Y 4/2) to brown (10YR 5/3).

Lindside soils are near somewhat poorly drained to poorly drained Newark soils and well drained Huntington soils. They are better drained than Newark soils, and they are not as well drained as Huntington soils.

Ln—Lindside silt loam. This nearly level soil is on flood plains adjacent to intermittent and perennial streams. Slopes are 0 to 3 percent.

Included with this soil in mapping are small areas of Huntington, Newark, Brinkerton, and Clarksburg soils and a few areas of soils that have a shaly, channery, or loam surface layer. Some of the soils have as much as 3 inches of sand, silt, gravel, or coal chips in the subsoil. Also included are a soil along Peters Creek that is similar to Lindside silt loam but containing coal chips throughout the profile and a few small areas of soils that are less than 5 feet deep to bedrock.

This soil receives runoff from adjacent, sloping soils. It is also subject to flooding.

The hazard of flooding is a limitation for community development and recreation use. A seasonal high water table and the hazard of flooding are limitations for cultivated crops. Drainage increases the soils suitability for crops, but in some places drainage is not feasible because there are no adequate outlets. This soil is not suited to orchards because of poor air drainage. Capability unit IIw–1.

Newark Series

The Newark series consists of deep, nearly level poorly drained to somewhat poorly drained soils on flood plains adjacent to streams. These soils formed in recent alluvium.

In a representative profile the surface layer is dark grayish-brown silt loam about 9 inches thick. The subsoil is 25 inches thick. In the upper 5 inches it is mottled, dark grayish-brown, friable silt loam. In the 16 inches below that it is mottled, dark grayish-brown, firm silty clay loam. In the lower 4 inches it is mottled, dark-gray, friable silt loam. The substratum is dark-gray, stratified loam and silt loam.

Permeability is moderate, and the available water capacity is high. In most years the water table is at the surface or within 1 foot of the surface late in winter and early in spring.

The high water table and the hazard of flooding are limitations for land use.

Representative profile of Newark silt loam, on a flood plain, 100 feet southwest of marker No. 2-240 of Columbia Gas Test Station along Route 02008, 1/3 mile west of its intersection with Route 680, in North Fayette Township.

Ap—0 to 9 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, medium, granular structure; friable, slightly sticky and slightly plastic; many roots; medium acid; clear, smooth boundary.

B1g—9 to 14 inches, dark grayish-brown (2.5Y 4/2) silt loam; weak, fine, subangular blocky structure; friable, slightly sticky and slightly plastic; common roots; medium acid; clear, wavy boundary.

B2g—14 to 30 inches, dark grayish-brown (2.5Y 4/2) silty clay loam; few, medium, distinct, brown (7.5YR 4/4) mottles; weak and moderate, medium and coarse, subangular blocky structure; firm, slightly sticky and slightly plastic; few roots; neutral; clear, wavy boundary.

B3g—30 to 34 inches, dark-gray (2.5Y 4/0) silt loam; many, medium, prominent, strong-brown (7.5YR 5/6) mottles,; weak, coarse, subangular blocky structure; friable, slightly sticky and slightly plastic; neutral; gradual, wavy boundary.

Cg—34 to 60 inches, dark-gray (2.5Y 4/0) loam stratified with silt loam; many, medium, prominent, strong-brown (7.5YR 5/6) mottles; massive; friable, nonsticky and nonplastic; neutral.

The solum is 24 to 36 inches thick. Bedrock is at a depth of more than 5 feet.

The Ap horizon ranges from brown (10YR 4/3) to dark grayish brown (10YR 4/2).

The B horizon ranges from dark grayish brown (10YR 4/2) to gray (N 6/0) and contains as much as 5 percent coarse fragments.

The C horizon ranges from dark grayish brown (2.5Y 4/2) to gray (N 6/0) and from silty clay loam to loam. This horizon contains as much as 20 percent coarse fragments.

Newark soils are near the well drained Huntington soils and the moderately well drained Lindside soils. They are not so well drained as Huntington soils, and they are wetter than Lindside soils. They are similar to the more acid Atkins soils on flood plains.

Ne—Newark silt loam. This nearly level soil is on flood plains adjacent to intermittent and perennial streams. Slopes are 0 to 3 percent.

Included with this soil in mapping are small areas of Huntington, Lindside, Brinkerton, and Clarksburg soils and scattered areas of soils that have a shaly, channery, or loam and silty clay loam surface layer. Also included are soils that have loam and clay loam in the subsoil, a similar soil along Peters Creek that contains coal chips throughout the profile, and small scattered areas of soils that have bedrock within a depth of 5 feet.

This soil receives runoff from adjacent, more sloping soils. It is also subject to flooding.

Flooding and a high water table are limitations for community development and recreation use. They are also limitations for cultivated crops (fig. 10).

Drainage increases the suitability for crops, but in some places, drainage is not feasible because there are no adequate outlets. This soil is generally not suited to orchards because of poor air drainage. Capability unit IIIw–1.

Philo Series

The Philo series consists of deep, nearly level, moderately well drained soils on flood plains adjacent to or near streams. These soils formed in relatively recent alluvium.

In a representative profile the surface layer is dark grayish-brown silt loam about 9 inches thick. The subsoil is 25 inches thick. It is brown, friable silt loam in the upper 9 inches and is mottled, brown, friable silt loam in the lower 16 inches. The substratum is mottled,

Figure 10.—**Small grain has been harvested from Newark silt loam on this flood plain.**

brown and dark grayish-brown loam and sandy loam.

Permeability is moderate and the available water capacity is high. In most years the water table is at a depth of 1½ to 3 feet late in winter and early in spring.

The seasonal high water table and the hazard of flooding are limitations to land use.

In a representative profile of Philo silt loam, in an idle area, 30 feet west of the Warrendale-Bayne Road, 2/10 mile north of its intersection with Route A-3755 and 90 feet south of telephone pole, in Marshall Township.

Ap—0 to 9 inches, dark grayish-brown (10YR 4/2) silt loam; moderate and weak, medium, granular structure; friable, nonsticky and nonplastic; many roots; strongly acid; clear, smooth boundary.

B1—9 to 18 inches, brown (10YR 4/3) silt loam; weak, fine, subangular blocky structure; friable, slightly sticky and slightly plastic; many roots; 5 percent coarse fragments; strongly acid; gradual, smooth boundary.

B2—18 to 34 inches, brown (10YR 4/3) silt loam; common, medium, distinct, grayish-brown (10YR 5/2) and dark yellowish-brown (10YR 4/4) mottles; weak, medium, subangular blocky structure; friable, slightly sticky and slightly plastic; few roots; 5 percent coarse fragments; strongly acid; abrupt, smooth boundary.

C1—34 to 42 inches, brown (10YR 4/3) loam; common, medium, distinct, dark grayish-brown (2.5Y 4/2) and yellowish-brown (10YR 5/6) mottles; massive; friable, nonsticky and nonplastic; few roots; 5 percent coarse fragments; strongly acid; abrupt, smooth boundary.

IIC2—42 to 60 inches, dark grayish-brown (2.5Y 4/2) sandy loam; common, medium, faint, olive-brown (2.5Y 4/4) mottles; massive; friable, slightly sticky and slightly plastic; 5 percent coarse fragments; strongly acid.

The solum is 24 to 40 inches thick. Bedrock is at a depth of more than 5 feet.

The Ap horizon ranges from very dark grayish brown (10YR 4/2) to dark brown (10YR 4/3). It contains as much as 10 percent coarse fragments.

The B horizon ranges from brown (10YR 5/3) to dark yellowish brown (10YR 4/4) and is mottled above a depth of 24 inches. It ranges from silt loam to sandy loam and contains as much as 10 percent coarse fragments. The B and C horizons are strongly acid or very strongly acid.

The C horizon ranges from grayish brown (10YR 5/2) to olive brown (2.5Y 4/4) and is mottled. It ranges from sandy loam to silt loam and includes thin strata of sand, silt, and gravel.

Philo soils are near the poorly drained Atkins soils. Philo soils are better drained than Atkins soils. They are similar to the less acid Lindside soils on flood plains.

Ph—Philo silt loam. This nearly level soil is on flood plains adjacent to intermittent and perennial streams. Slopes are 0 to 3 percent.

Included with this soil in mapping are small areas of

Atkins and Ernest soils and small areas of soils on alluvial fans that are generally not subject to flooding. Also included are scattered areas of soils that are less than 5 feet deep to bedrock and small areas of soils that have a very shaly or very channery profile.

This soil receives runoff from adjacent, steeper soils. It is also subject to flooding.

The hazard of flooding is a limitation for community development and recreation use. A seasonal high water table and the hazard of flooding are limitations for cultivated crops. Drainage increases the soil's suitability for crops, but in some places drainage is not feasible because there are no adequate outlets. This soil is generally not suited to orchards because of poor air drainage. Capability unit IIw–1.

Rainsboro Series

The Rainsboro series consists of deep, nearly level to sloping, moderately well drained soils that have a fragipan. These soils are on old terraces that are as much as 300 feet above the present flood plain. These soils formed in old acid alluvium.

In a representative profile the surface layer is dark grayish-brown silt loam about 9 inches thick. The subsoil is 51 inches thick. In the upper 14 inches it is yellowish-brown, friable silt loam. In the 3 inches below that it is mottled, yellowish-brown, friable silt loam. Below that is a fragipan, which is 14 inches of mottled, strong-brown, very firm and brittle silt loam. The lower 20 inches, which is also a fragipan, is mottled, strong-brown, very firm and brittle sandy clay loam. The substratum is mottled, yellowish-brown loam.

Permeability is slow, and the available water capacity is moderate. In most years the water table is at a depth of 1½ to 3 feet late in winter and early in spring.

The seasonal high water table, slow permeability, and slope in some areas are limitations to land use.

Representative profile of Rainsboro silt loam, 0 to 3 percent slopes, in the Rural Industrial Development Corporation development, 150 feet south of Beta Drive and 500 feet northeast of its intersection with Alpha Drive, in O'Hara Township.

Ap—0 to 9 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, fine, granular structure; friable, nonsticky and nonplastic; many roots; strongly acid, abrupt, smooth boundary.

B1—9 to 13 inches, yellowish-brown (10YR 5/6) silt loam; dark grayish-brown (10YR 4/2) worm casts; weak and moderate, fine, subangular blocky structure; friable, slightly sticky and slightly plastic; many roots; strongly acid; abrupt, wavy boundary.

B21t—13 to 23 inches, yellowish-brown (10YR 5/6) silt loam; dark grayish-brown (10YR 4/2) worm casts; moderate, fine, subangular blocky structure; friable, slightly sticky and slightly plastic; few roots; thin discontinuous clay films; strongly acid; clear, wavy boundary.

B22t—23 to 26 inches, yellowish-brown (10YR 5/6) silt loam; common, fine, distinct, strong-brown (7.5YR 5/6), light brownish-gray (10YR 6/2), and very pale brown (10YR 7/3) mottles; weak, medium, platy structure parting to weak, medium, angular blocky; friable, slightly sticky and slightly plastic; few roots; thin discontinuous clay films; strongly acid; abrupt, wavy boundary.

Bx1—26 to 36 inches, strong-brown (7.5YR 5/6) silt loam; many coarse, prominent, light brownish-gray (2.5Y 6/2) streaks; moderate, very coarse, prismatic structure parting to weak, medium and thick, platy; very firm and brittle, slightly sticky and slightly plastic; thin discontinuous light-gray (2.5Y 7/2) clay films on prisms; strongly acid; clear, wavy boundary.

Bx2—36 to 40 inches, strong-brown (7.5YR 5/6) silt loam; common, medium and fine, prominent, light brownish-gray (2.5Y 6/2) mottles; moderate, very coarse, prismatic structure parting to weak, medium and thick platy; very firm and brittle, slightly sticky and slightly plastic; thin discontinuous clay films on prisms; strongly acid; abrupt, smooth boundary.

IIBx3—40 to 60 inches, strong-brown (7.5YR 5/8) sandy clay loam; light brownish-gray (2.5Y 6/2) vertical prism faces; few, fine, prominent, black (10YR 2/1) concretions; moderate, very coarse, prismatic structure parting to weak, medium, and thick, platy; very firm and brittle, slightly sticky and slightly plastic; few clay films on prisms; 2 percent gravel; medium acid; abrupt, wavy boundary.

IIC—60 to 65 inches, yellowish-brown (10YR 5/6) loam; few, medium, prominent, light brownish-gray (2.5Y 6/2) mottles; massive; friable, slightly sticky and slightly plastic; 2 percent gravel; medium acid.

The solum is 60 inches or more thick. The depth to the fragipan is 20 to 30 inches.

The Ap horizon ranges from dark grayish brown (10YR 4/2) to brown (10YR 4/3).

The Bt horizon has dominant colors ranging from yellowish brown (10YR 5/6) to brown (10YR 5/3) and ranges from silt loam to silty clay loam. The Bx horizon ranges from yellowish brown (10YR 5/6) to strong brown (7.5YR 5/8) and from silty clay loam to loam. It contains as much as 15 percent coarse fragments. The B and C horizons are medium acid to very strongly acid.

Rainsboro soils are near the well-drained Allegheny variant soils. Rainsboro soils are not so well drained as the Allegheny variant soils.

RaA—Rainsboro silt loam, 0 to 3 percent slopes. This nearly level soil is on terraces. It has the profile described as representative of the series.

Included with this soil in mapping are small areas of Allegheny variant and Ernest soils and small areas of poorly drained and somewhat poorly drained soils. Also included are soils that have a surface layer of loam.

Runoff is slow.

The seasonal high water table and slow permeability are limitations for community development and recreation use. The seasonal high water table and the fragipan are limitations for cultivated crops. Drainage increases the suitability for crops. Capability unit IIw–2.

RaB—Rainsboro silt loam, 3 to 8 percent slopes. This gently sloping soil is on stream terraces. It has a profile similar to the one described as representative of the series, but it is 1 to 3 inches less deep to the fragipan.

Included with this soil in mapping are small areas of Allegheny variant and Ernest soils and small areas of soils that have slopes of less than 3 percent or more than 8 percent. Also included are areas of poorly drained and somewhat poorly drained soils and areas of soils that have a surface layer of loam.

Runoff is medium.

The seasonal high water table and slow permeability are limitations for community development and recreation use. The hazard of erosion, the seasonal high water

table, and the fragipan are limitations for cultivated crops. Drainage increases the suitability for crops. Conservation practices are needed to help control erosion. Capability unit IIe–3.

RaC—Rainsboro silt loam, 8 to 15 percent slopes. This sloping soil is on old stream terraces. It has a profile similar to the one described as representative of the series, but it is 2 to 4 inches less deep to the fragipan.

Included with this soil in mapping are small areas of Allegheny variant and Ernest soils and small areas of soils that have slopes of less than 8 percent or more than 15 percent. Also included are soils that have a surface layer of loam.

Runoff is medium.

The seasonal high water table, slow permeability, and slope are limitations for community development and recreation use. The hazard of erosion, the seasonal high water table, and the fragipan are limitations for cultivated crops. Drainage increases the suitability for crops. Conservation practices are needed to help control erosion. Capability unit IIIe–4.

Rayne Series

The Rayne series consists of deep, nearly level to sloping, well-drained soils on uplands. These soils formed in material that weathered from shale and fine-grained sandstone bedrock.

In a representative profile the surface layer is dark grayish-brown silt loam about 8 inches thick. The subsoil is 30 inches thick. In the upper 6 inches it is yellowish-brown, friable silt loam. In the 19 inches below that it is yellowish-brown, firm silty clay loam. In the lower 5 inches it is yellowish-brown, firm shaly loam. The substratum is light olive-brown very shaly loam. Shale bedrock is below a depth of 46 inches.

Permeability is moderate, and the available water capacity is high.

Slope in some areas and depth to bedrock are limitations for land use.

Representative profile of Rayne silt loam, 2 to 8 percent slopes, in an idle field, 2/10 mile south of the intersection of Route A-3755 and Warrendale-Bayne Road, in Franklin Park Borough. (Pennsylvania Department of Transportation engineering test data samples BP-32652 and BP-32653 were take from this profile.)

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; very friable, slightly sticky and slightly plastic; many roots; 2 percent coarse fragments; medium acid; abrupt, smooth boundary.

B1—8 to 14 inches, yellowish-brown (10YR 5/6) silt loam; weak, fine, subangular blocky structure; friable, slightly sticky and slightly plastic; many roots; 2 percent coarse fragments; strongly acid; clear, wavy boundary.

B21t—14 to 26 inches, yellowish-brown (10YR 5/6) silty clay loam; moderate, medium, subangular blocky structure; firm, sticky and plastic; common roots; thin clay films; 5 percent coarse fragments; strongly acid; clear, wavy boundary.

B22t—26 to 33 inches, yellowish-brown (10YR 5/4) silty clay loam; moderate, medium, subangular blocky structure; firm, sticky and plastic; common roots; thin clay films; 10 percent coarse fragments; strongly acid; abrupt, smooth boundary.

B3—33 to 38 inches, yellowish-brown (10YR 5/4) shaly loam; weak, coarse, subangular blocky structure; firm, slightly sticky and slightly plastic; few roots; patchy, clay films; 20 percent coarse fragments; strongly acid; abrupt, smooth boundary.

C—38 to 46 inches, light olive-brown (2.5Y 5/4) very shaly loam; massive structure parting to horizontal shale bedrock; friable, nonsticky and nonplastic; 75 percent coarse fragments; strongly acid; gradual, wavy boundary.

R—46 inches, light olive-brown (2.5Y 5/4) weathered and fractured shale.

The solum is 36 to 48 inches thick. Depth to bedrock is 40 to 60 inches.

The Ap horizon ranges from dark grayish brown (10YR 4/2) to brown (10YR 5/3). It contains as much as 5 percent coarse fragments.

The B horizon ranges from yellowish brown (10YR 5/6) to dark yellowish brown (10YR 4/4) and from silt loam to silty clay loam in the upper part and silt loam to loam in the lower part. Coarse fragment content in the B horizon is 2 to 40 percent and increases as depth increases. The B and C horizons are strongly acid or very strongly acid.

The C horizon ranges from loam to silt loam. It contains 30 to 90 percent coarse fragments.

Rayne soils are near Gilpin and Clymer soils. They are deeper than Gilpin soils and they contain less sand in the B horizon than Clymer soils.

RyB—Rayne silt loam, 2 to 8 percent slopes. This nearly level and gently sloping soil is generally on broad ridgetops or on broad, gently sloping hillsides. It has the profile described as representative of the series. Slopes are slightly convex.

Included with this soil in mapping are small areas of Gilpin, Clymer, and Wharton soils and small areas of soils that have slopes of more than 8 percent.

Runoff is slow to medium.

The 40- to 60-inch depth to bedrock is a limitation for community development and recreation use. This soil is suited to all crops grown in the county. Conservation practices are needed to help control erosion. Capability unit IIe–1.

RyC—Rayne silt loam, 8 to 15 percent slopes. This sloping soil is generally in long, contour areas on hillsides. It has a profile similar to the one described as representative of the series, but the surface layer is 1 to 2 inches thinner. Slopes are convex.

Included with this soil in mapping are small areas of Gilpin and Wharton soils and small areas of soils that have slopes of less than 8 percent or more than 15 percent.

Runoff is medium.

Slope is a limitation for community development and recreation use. This soil is suited to all crops in the county. Conservation practices are needed to help control erosion. Capability unit IIIe–1.

Strip Mines

This nearly level to very steep land type consists of spoil material that remains after coal is strip mined.

In a representative area of strip mines, in the vicinity of Routes 02245 and 02069, in Findley Township, the soil material is mostly mixed soil material and fragments of sandstone, shale, limestone, and coal. It is 15 to 120 feet thick. Coarse fragments make up 30 to 65 percent of the volume. The soil material is loam, clay loam, sandy loam, and silty clay loam.

The material is mildly alkaline to extremely acid. Water and air move through the material freely.

SmB—Strip mines, 0 to 8 percent slopes. This nearly level and gently sloping land type is on ridgetops or in long, narrow, contour areas on hillsides. The areas have been leveled after strip mining, but the surface is rough.

Included in mapping are many areas of the mining high wall on hillsides. Also included are small areas of soils that have slopes of more than 8 percent and areas of material that is moderately alkaline and effervesces with hydrochloric acid.

Runoff is low to medium.

Areas of this land type are highly variable over short distances. Onsite investigation is required to determine the potential for land use. Rock fragments are a limitation in some areas. Vegetation is difficult to establish, especially where the material is extremely acid. Conservation practices are needed. Not assigned to a capability unit.

SmD—Strip mines, 8 to 25 percent slopes. This sloping and moderately steep land type is generally in long, narrow, contour areas on hillsides. The areas have been leveled after strip mining, but the surface is rough.

Included in mapping are areas of the mining high wall. Excavated areas are common, and some are filled with water. Also included are small areas of soils that have slopes of less than 8 percent or more than 25 percent and areas of material that is moderately alkaline and effervesces with hydrochloric acid.

Runoff is rapid.

Slope and rock fragments in some areas are limitations for land use. Vegetation is difficult to establish, especially where the material is extremely acid. Conservation practices are needed. Not assigned to a capability unit.

SmF—Strip mines, 25 to 75 percent slopes. This land type is generally on ridgetops or in long, narrow, contour areas on hillsides. No leveling has been done. Slopes are short and steep or very steep.

Included in mapping are many areas of the mining high wall and deep excavations that are filled with water. Also included are areas of soils that have slopes of less than 25 percent and areas of material that is moderately alkaline and effervesces with hydrochloric acid.

Runoff is very rapid.

Slope is a limitation for land use. Vegetation is difficult to establish, especially where the material is extremely acid. Conservation practices are needed. Not assigned to a capability unit.

Upshur Series

The Upshur series consists of deep, gently sloping to very steep, well-drained soils on uplands. These soils formed in material that weathered from red clay shale bedrock.

In a representative profile the surface layer is dark reddish-gray silty clay loam about 6 inches thick. The subsoil is 25 inches thick. It is reddish-brown, firm clay in the upper 20 inches and dusky-red, firm shaly silty clay in the lower 5 inches. The substratum is dusky-red shaly silty clay and very shaly silty clay.

Permeability is slow, and the available water capacity is moderate. The soils are susceptible to landslide.

Slow permeability, the susceptibility to landslide, and slope in some areas are limitations for land use.

Representative profile of Upshur silty clay loam, 3 to 8 percent slopes, along Camp Meeting Road about 2/10 mile southwest of its intersection with Route 02321, 50 feet north of pole No. 104/198, in Bell Acres.

Ap—0 to 6 inches, dark reddish-gray (5YR 4/2) silty clay loam; moderate, fine and very fine, subangular blocky structure; firm, sticky and plastic; many roots; slightly acid; abrupt, smooth boundary.

B21t—6 to 12 inches, reddish-brown (2.5YR 4/4) clay; weak, coarse to very coarse, prismatic structure parting to moderate, medium to coarse, subangular and angular blocky; firm, sticky and plastic; common roots; thin continuous dark reddish-brown (5YR 3/3) clay films; slightly acid; gradual, wavy boundary.

B22t—12 to 26 inches, reddish-brown (2.5YR 4/4) clay; weak, coarse to very coarse, prismatic structure parting to moderate, coarse, subangular blocky; firm, sticky and plastic; common roots; thin continuous dark reddish-brown (5YR 3/3) clay films; slightly acid; abrupt, smooth boundary.

B3t—26 to 31 inches, dusky-red (10YR 3/3) shaly silty clay; weak, coarse, subangular blocky structure; numerous diagonal slickensides of dark reddish-gray (10YR 3/1) and very dusky red (10YR 2/2) truncating structure; firm, sticky and plastic; few roots; thin continuous dark reddish-brown (5YR 3/3) clay films; 25 percent soft coarse fragments; mildly alkaline; gradual, wavy boundary.

C1—31 to 44 inches, dusky-red (10YR 3/3) shaly silty clay; massive numerous diagonal slickensides of dark reddish gray (10YR 3/1) and very dusky red (10YR 2/2); truncating structure; firm, sticky and plastic; 50 percent soft coarse fragments; mildly alkaline; gradual, wavy boundary.

C2—44 to 64 inches, dusky-red (10YR 3/3) very shaly silty clay; massive numerous diagonal slickensides of dark reddish gray (10YR 3/1) and very dusky red (10YR 2/2); firm, sticky and plastic; 70 percent soft coarse fragments; mildly alkaline.

The solum is 28 to 42 inches. Bedrock is at a depth of 4 to 6 feet.

The Ap horizon ranges from dark brown (7.5YR 3/2) to reddish brown (5YR 4/4) and dark reddish gray (5YR 4/2) and from silt loam to silty clay loam.

The B horizon ranges from reddish brown (5YR 4/4) to dusky red (10YR 3/3). The lower part of the B horizon and the C horizon are medium acid to mildly alkaline.

The C horizon ranges from dusky red (10YR 3/3) to reddish brown (5YR 4/3) and from silty clay loam to clay. Brown or olive colors are intermixed with red in the C horizon or they underlie the red. This horizon contains 20 to 70 percent coarse fragments.

Upshur soils are near Gilpin soils and moderately well drained Vandergrift and Wharton soils. They are better drained than Vandergrift and Wharton soils, and they are deeper than Gilpin soils.

UaB—Upshur silty clay loam, 3 to 8 percent slopes. This gently sloping soil is generally on ridgetops. It has the profile described as representative of the series.

Included with this soil in mapping are small areas of Gilpin, Wharton, Guernsey, and Vandergrift soils, small areas of soils that have slopes of more than 8 percent, and soils that have a surface layer of silt loam. Erosion has exposed the subsoil in some places.

Runoff is medium. Some springs and ground water seepage spots are on the hillsides.

Susceptibility to landslide and slow permeability are limitations for community development and recreation use. This soil is suited to all crops grown in the county. Poor tilth is a limitation for crops. Conservation practices are needed to help control erosion. Capability unit IIIe–3.

UaC—Upshur silty clay loam, 8 to 15 percent slopes. This sloping soil is generally in contour areas on hillsides. It has a profile similar to the one described as representative of the series, but the solum is 1 to 2 inches thinner. Slopes are concave.

Included with this soil in mapping are small areas of Gilpin, Wharton, Guernsey, and Vandergrift soils, small areas of soils that have slopes of less than 8 percent or more than 15 percent, and soils that have a surface layer of silt loam. Erosion has exposed the subsoil in some places.

Runoff is medium. Some springs and ground water seepage spots are on the hillsides.

The susceptibility to landslide, slope, and slow permeability are limitations for community development and recreation use. This soil is suited to all crops grown in the county. Poor tilth is a limitation for crops. Conservation practices are needed to help control erosion. Capability unit IVe–3.

Urban Land

This land type consists of land so altered by earth moving or so obscured by buildings or other structures that the original soils cannot be identified. In some places, cuts have removed all or nearly all the natural soil horizons. In other places, fills have buried the original soils.

UB—Urban land. This nearly level land type is on flood plains. It consists mainly of fill material that was hauled in and placed over the natural soils. Slopes are 0 to 3 percent.

The composition of this mapping unit is more variable and areas are generally much larger than those of most other mapping units in the county. Mapping is adequate, however, for the anticipated uses of the soils.

The fill material is 2 feet or more thick. It is highly variable material, including rubbish, cinders, industrial waste, old brick and other building materials, limestone, sandstone, shale, and soil material. It overlies natural soils, such as Atkins, Philo, Newark, and Lindside soils (fig. 11). The areas are covered extensively by buildings and other structures.

Included in mapping are small areas of Atkins, Newark, Philo, and Lindside soils and areas of cut and fill land.

Areas of this land type receive surface runoff from adjacent, more sloping soils. Flooding is a problem in some areas.

The intense urban development precludes most other land uses. In the undeveloped areas, onsite investigation is required to determine the kind and degree of limitations. Not assigned to a capability unit.

UCB—Urban land-Culleoka complex, gently sloping.

Figure 11.—**Urban land, on the left, consists of fill material over Atkins silt loam.**

This mapping unit is on the top of ridges or in long, narrow areas on hillsides. Slopes are 0 to 8 percent.

The composition of this mapping unit is more variable and areas are generally much larger than those of most other mapping units in the county. Mapping is adequate, however, for the anticipated uses of the soils. The complex is about 75 percent Urban land, 15 percent Culleoka soils, and 10 percent other soils.

In the Urban land part, the natural soils and underlying bedrock have been cut from some places and used as fill in other places. Many of these areas are covered by buildings and other structures. Much of the exposed cut and fill material is strongly acid to extremely acid.

Included in mapping are small areas of Gilpin, Dormont, Guernsey, and Wharton soils and small areas where slopes are more than 8 percent. Also included, mostly in the suburbs, are areas that are mainly Culleoka soils. In other areas, such as much of Pittsburgh, the Culleoka soils are minor in extent. In some areas, very steep cut and fill escarpments are also included.

Areas of this complex are variable, and onsite investigation is required to determine the kind and degree of limitations for land use. The intense urban development generally precludes most other uses. Not assigned to a capability unit.

UCD—Urban land-Culleoka complex, moderately steep. This mapping unit is on hillsides. Slopes are 8 to 25 percent.

The composition of this mapping unit is more variable and areas are generally much larger than those

of most other mapping units in the county. Mapping is adequate, however, for the anticipated uses of the soils. The complex is about 65 percent Urban land, 20 percent Culleoka soils, and 15 percent other soils.

In the Urban land part, the natural soils and underlying bedrock have been cut from some places and used as fill in other places. Many of these areas are covered by buildings and other structures (fig. 12). Much of the exposed cut and fill material is strongly acid to extremely acid.

Figure 12.—**Urban development has altered or covered much of the natural soil. Only small spots of Culleoka soils remain in this area of Urban land-Culleoka complex, moderately steep.**

Included in mapping are small areas of Gilpin, Dormont, Guernsey, Weikert, and Wharton soils and small areas of soils that have slopes of less than 8 percent or more than 25 percent. Also included, mostly in the suburbs, are areas that are mainly Culleoka soils. In other areas, such as much of Pittsburgh, the Culleoka soils are very minor in extent. In many areas, very steep cut and fill escarpments are also included.

Areas of this complex are variable, and onsite investigation is required to determine the kind and degree of limitations for land use. Slope is generally a limitation. The intense urban development precludes most other uses. Not assigned to a capability unit.

UCE—Urban land-Culleoka complex, steep. This mapping unit is on hillsides. Slopes are 25 to 80 percent.

The composition of this mapping unit is more variable and areas are generally much larger than those of most other mapping units in the county. Mapping is adequate, however, for the anticipated uses of the soils. The complex is about 55 percent Urban land, 25 percent Culleoka soils, and 20 percent other soils.

In the Urban land part, the natural soils and underlying bedrock have been cut from some places and used as fill in other places. Very steep cut and fill escarpments are in these areas. Many of the areas are covered by buildings and other structures. Much of the exposed cut and fill material is strongly acid to extremey acid.

Included in mapping are small areas of Gilpin and Weikert soils and small areas where slopes are less than 25 percent. Also included are areas that are mainly Culleoka and Weikert soils.

Surface runoff is very rapid.

Slope is the main limitation for land use. Not assigned to a capability unit.

UGB—Urban land-Guernsey complex, gently sloping. This mapping unit is on top of ridges or in long, narrow areas on hillsides. Slopes are 0 to 8 percent.

The composition of this mapping unit is more vari-

able and areas are generally much larger than those of most other mapping units in the county. Mapping is adequate, however, for the anticipated uses of the soils. The complex is about 75 percent Urban land, 15 percent Guernsey soils, and 10 percent other soils.

In the Urban land part, the natural soils and bedrock have been cut from some places and used as fill in other places. Many of these areas are covered by buildings and other structures. Much of the exposed cut and fill material is medium acid to neutral.

Included in mapping are small areas of Library and Culleoka soils and small areas of soils that have slopes of more than 8 percent. Also included are scattered landslides on steep fill slopes and areas, mostly in the suburbs, that are mainly Guernsey soils. In other areas, including much of Pittsburgh, the Guernsey soils are minor in extent. In some areas, very steep cut and fill escarpments are also included.

Areas of this complex are variable and onsite investigation is required to determine the kind and degree of limitations for land use. Seasonal wetness and ground water seepage is generally a limitation. Some steep and very steep fill slopes are susceptible to landslide. The intense urban development generally precludes most other uses. Not assigned to a capability unit.

UGD—Urban land-Guernsey complex, moderately steep. This mapping unit is on hillsides. Slopes are 8 to 25 percent.

The composition of this mapping unit is more variable and areas are generally much larger than those of most other mapping units in the county. Mapping is adequate, however, for the anticipated uses of the soils. The complex is about 65 percent Urban land, 20 percent Guernsey soils, and 15 percent other soils.

In the Urban land part, the natural soils and bedrock have been cut from some places and used as fill in other places. Many of these areas are covered by buildings and other structures. Much of the exposed cut and fill material is medium acid to neutral.

Included in mapping were small areas of Library and Culleoka soils, small areas of soils that have slopes of less than 8 percent or more than 25 percent, and scattered landslides. Also included, mostly in the suburbs, are areas that are mainly Guernsey soils. In other areas, including much of Pittsburgh, the Guernsey soils are minor in extent. In many areas, steep cut and fill escarpments are also included.

Areas of this complex are variable, and onsite investigation is required to determine the kind and degree of limitation for land use. Slope is generally a limitation. Seasonal wetness or ground water seepage is a limitation in places. Some fill areas are susceptible to landslide. The intense urban development generally precludes most other land uses. Not assigned to a capability unit.

URB—Urban land-Rainsboro complex, gently sloping. This mapping unit is on terraces. Slopes are 0 to 8 percent.

The composition of this mapping unit is more variable and areas are generally much larger than those of most other mapping units in the county. Mapping is adequate, however, for the anticipated uses of the soils. The complex is about 75 percent Urban land, 15 percent Rainsboro soils, and 10 percent other soils.

In the Urban land part, the natural soils have been cut from some places and used as fill in other places. Many of these areas are covered by buildings and other structures. The exposed cut and fill material is medium acid to very strongly acid.

Included in mapping are small areas of Allegheny variant and Ernest soils and small areas of soils that have slopes of more than 8 percent. Also included, mostly in the suburbs, are areas that are mainly Rainsboro soils. In other areas, including much of Pittsburgh, the Rainsboro soils are minor in extent.

Areas of this complex are variable, and onsite investigation is required to determine the kind and degree of limitation for land use. Seasonal wetness is generally a limitation. The intense urban development generally precludes most other uses. Not assigned to a capability unit.

URC—Urban land-Rainsboro complex, sloping. This mapping unit is on terraces.

The composition of this mapping unit is more variable and areas are generally much larger than those of most other mapping units in the county. Mapping is adequate, however, for the anticipated uses of the soils. The complex is about 75 percent Urban land, 15 percent Rainsboro soils, and 10 percent other soils.

In the Urban land part, the natural soils and underlying terrace material have been cut from some places and used as fill in other places. Many of these areas are covered by buildings and other structures. The exposed cut and fill material is medium acid to very strongly acid.

Included in mapping are small areas of Allegheny variant and Ernest soils and small areas of soils that have slopes of less than 8 percent or more than 15 percent. Also included, mostly in the suburbs, are areas that are mainly Rainsboro soils. In other areas, including Pittsburgh, the Rainsboro soils are minor in extent. In some areas, steep cut and fill escarpments are also included.

Areas of this complex are variable, and onsite investigation is required to determine the kind and degree of limitation for land use. Slope and seasonal wetness are generally limitations. The intense urban development generally precludes other uses. Not assigned to a capability unit.

UWB—Urban land-Wharton complex, gently sloping. This mapping unit is on top of ridges or in long, narrow areas on hillsides. Slopes are 0 to 8 percent.

The composition of this mapping unit is more variable and areas are generally much larger than those of most other mapping units in the county. Mapping is adequate, however, for the anticipated uses of the soils. The complex is about 75 percent Urban land, 15 percent Wharton soils, and 10 percent other soils.

In the Urban land part, the natural soils and bedrock have been cut from some places and used as fill in other places. Many of these areas are covered by buildings and other structures. Much of the exposed cut and fill material is strongly acid to extremely acid.

Included in mapping were small areas of Cavode and Gilpin soils and small areas of soils that have slopes of more than 8 percent. Also included, mostly in

the suburbs, are areas that are mainly Wharton soils. In other areas, including Pittsburgh, the Wharton soils are very minor in extent. In some areas, very steep cut and fill escarpments are also included.

Areas of this complex are variable, and onsite investigation is required to determine the kind and degree of limitation for land use. Seasonal wetness or ground water seepage is generally a limitation. The intense urban development generally precludes most other uses. Not assigned to a capability unit.

UWD—Urban land-Wharton complex, moderately steep. This mapping unit is on top of ridges or on long, narrow areas on hillsides. Slopes are 8 to 25 percent.

The composition of this mapping unit is more variable and areas are generally much larger than those of most other mapping units in the county. Mapping is adequate, however, for the anticipated uses of the soils. The complex is about 65 percent Urban land, 20 percent Wharton soils, and 15 percent other soils.

In the Urban land part, the natural soils and bedrock have been cut from some places and used as fill in other places. Many of these areas are covered by buildings and other structures. Much of the exposed cut and fill material is strongly acid to extremely acid.

Included in mapping are small areas of Gilpin soils and small areas of soils that have slopes of less than 8 percent or more than 25 percent. Also included, mostly in the suburbs, are areas that are mainly Wharton soils. In other areas, including Pittsburgh, Wharton soils are very minor in extent. In many areas, very steep cut and fill escarpments are also included.

Areas of this complex are variable, and onsite investigation is required to determine the kind and degree of limitation for land use. Slope is a limitation. Seasonal wetness or ground water seepage is generally a limitation. The intense urban development precludes most other uses. Not assigned to a capability unit.

Vandergrift Series

The Vandergrift series consists of deep, gently sloping to steep, moderately well drained soils on uplands and at the base of steeper upland slopes. These soils formed in material that weathered from red clay shale bedrock.

In a representative profile the surface layer is dark-brown silt loam about 8 inches thick. The subsoil is 34 inches thick. In the upper 6 inches it is red, firm silty clay loam. In the 8 inches below that it is mottled, reddish-brown, firm silty clay. Below that it is 12 inches of mottled, weak red, very firm silty clay. In the lower 8 inches it is mottled, reddish-brown, very firm silty clay. The substratum is mottled, reddish-brown and yellowish-brown clay and channery silty clay loam.

Permeability is slow, and the available water capacity is moderate. In most years the water table is at a depth of 1 to 2 feet late in winter and early in spring. The soils are susceptible to landslide.

The seasonal high water table, slow permeability, the susceptibility to landslide, and slope in the more sloping areas are limitations for land use.

Representative profile of Vandergrift silt loam in an area of Guernsey-Vandergrift silt loams, 3 to 8 percent slopes, in an orchard, 1/3 mile west of the intersection of Middle Road and Route 02126, in Hampton Township.

Ap—0 to 8 inches, dark-brown (7.5YR 3/2) silt loam; moderate, medium, granular structure; friable, slightly sticky and slightly plastic; many roots; strongly acid; abrupt, smooth boundary.

B21t—8 to 14 inches, red (2.5YR 4/6) silty clay loam; moderate, fine and medium, angular blocky structure; firm, sticky and plastic; common roots; thin continuous clay films; strongly acid; clear, wavy boundary.

B22t—14 to 22 inches, reddish-brown (2.5YR 4/4) silty clay; many, medium, distinct, reddish-gray (5YR 5/2) mottles; moderate, medium, angular blocky structure; firm, sticky and plastic; few roots; thin continuous clay films; medium acid; gradual, wavy boundary.

B23tg—22 to 34 inches, weak red (2.5YR 4/2) silty clay; many, coarse, prominent, light brownish-gray (10YR 6/2) and yellowish-red (5YR 5/6) mottles; moderate, medium and coarse, angular blocky structure; very firm; sticky and plastic; few roots; thin discontinuous clay films; medium acid; clear, wavy boundary.

B3t—34 to 42 inches, reddish-brown (2.5YR 4/4) silty clay; few, medium, prominent, light brownish-gray (10YR 6/2) mottles; weak, coarse, angular blocky structure; very firm, sticky and plastic; patchy clay films; medium acid; clear, wavy boundary.

C1—42 to 50 inches, reddish-brown (2.5YR 4/4) clay; few, fine, faint, dark reddish-gray (5YR 4/2) mottles; massive; very firm, sticky and plastic; 5 percent coarse fragments; medium acid; abrupt, wavy boundary.

IIC2—50 to 60 inches, yellowish-brown (10YR 5/4) channery silty clay loam; massive; firm, sticky and plastic; 30 percent coarse fragments; medium acid.

The solum is 40 to 48 inches thick. Bedrock is at a depth of more than 5 feet.

The Ap horizon ranges from dark brown (7.5YR 3/2) to dark reddish brown (5YR 3/4).

The B horizon ranges from red (2.5YR 4/6) to dark reddish gray (5YR 4/2); it is weak red (10YR 4/2) in the lower part. Mottles that have the chroma of 2 or less are within the upper 10 inches of the B horizon. The B horizon ranges from silty clay loam to clay and contains less than 10 percent coarse fragments.

The C horizon ranges from weak red (10YR 4/2) to yellowish brown (10YR 5/4) and from loam to clay. It contains 5 to 40 percent coarse fragments.

Vandergrift soils are near Gilpin soils, well drained Upshur soils, and moderately well drained Guernsey and Ernest soils. They are deeper than Gilpin soils and lack the Bx horizon of Ernest soils. They are not so well drained as the Upshur soils, and they have a reddish B horizon, which Guernsey soils lack.

Weikert Series

The Weikert series consists of shallow, gently sloping to very steep, well-drained soils on uplands. These soils formed in material that weathered from shale and fine-grained sandstone bedrock (fig. 13).

In a representative profile the surface layer is dark-brown, shaly silt loam about 6 inches thick. The subsoil is 7 inches thick. It is yellowish-brown, friable, very shaly silt loam. The substratum is yellowish-brown, very shaly loam. Shale bedrock is below a depth of 15 inches.

Permeability is moderately rapid, and the available water capacity is very low.

Shallowness and slope in some areas are limitations for land use.

Figure 13.—**Weikert shaly silt loam is 10 to 20 inches deep to shale and fine-grained sandstone bedrock.**

Representative profile of Weikert shaly silt loam, in an area of Gilpin, Weikert, and Culleoka shaly silt loams, very steep, in an idle area, 3/8 mile northeast of the Pennsylvania Turnpike overpass at U.S. Highway 19, in Marshall Township. (Pennsylvania Department of Transportation engineering test data sample BP-23278 was taken from this profile.)

Ap—0 to 6 inches, dark-brown (10YR 4/3) shaly silt loam; weak, fine, granular structure; friable, nonsticky and slightly plastic; many roots; 20 percent coarse fragments; strongly acid; abrupt, wavy boundary.

B—6 to 13 inches, yellowish-brown (10YR 5/4) very shaly silt loam; weak, fine, subangular blocky structure; friable, slightly sticky and slightly plastic; few roots; 60 percent coarse fragments; strongly acid; clear, wavy boundary.

C—13 to 15 inches, yellowish-brown (10YR 5/4) very shaly loam; massive parting to platy shale; friable, nonsticky and nonplastic; 85 percent coarse fragments; strongly acid; abrupt, smooth boundary.

R—15 inches, olive (5Y 5/3) weathered and fractured shale.

The solum thickness and depth to bedrock range from 10 to 20 inches.

The Ap horizon ranges from very dark grayish brown (10YR 3/2) to brown (10YR 4/3).

The B and C horizons range from yellowish brown (10YR 5/6) to dark yellowish brown (10YR 4/4) and contain 30 to 85 percent coarse fragments. The B and C horizons are medium acid to very strongly acid.

Weikert soils are near Gilpin and Culleoka soils. They are shallower to bedrock than Gilpin and Culleoka soils. Rock outcrops are common Weikert soils.

WEF—Weikert-Rock outcrop complex, very steep. This steep complex is on uplands. It is about 50 percent Weikert soils, 25 percent rock outcrop, and 25 percent other soils. The surface layer of the Weikert soils range from shaly silt loam to shaly loam. The rock outcrops generally are contour oriented ledges of bedrock.

Included in mapping are small areas of Gilpin and Culleoka soils and scattered areas of rockfall landslides.

Surface runoff is very rapid.

The soils in this complex have limitations for land use because of their slope and shallowness. They are suited to woodland and wildlife habitat. Capability unit VIIs–1.

Wharton Series

The Wharton series consists of deep, nearly level to moderately steep, moderately well drained soils on uplands. These soils formed in material that weathered from acid, gray clay shale.

In a representative profile the surface layer is about 10 inches thick. In the upper 3 inches it is very dark grayish-brown silt loam and in the lower 7 inches it is brown silt loam. The subsoil is 32 inches thick. In the upper 4 inches it is yellowish-brown, firm silt loam. In the 7 inches below that it is yellowish-brown, very firm silty clay loam. Below that it is 13 inches of mottled, brown, very firm silty clay loam. In the lower 8 inches it is mottled, strong-brown, very firm silty clay. The substratum is mottled, grayish-brown silty clay.

Permeability is slow, and the available water capacity is moderate. In most years the water table is at a depth of 1½ to 3 feet late in winter and early in spring.

The seasonal high water table, slow permeability, and slope in some areas are limitations for land use.

Representative profile of Wharton silt loam, 2 to 8 percent slopes, along the south side of Route 02280, 0.35 mile west of its intersection with Route 02126, in Hampton Township. (Pennsylvania Department of Transportation Engineering test data samples BP-32646 and BP-32647 were taken from this profile.)

Ap1—0 to 3 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, fine and very fine, granular structure; very friable, nonsticky and slightly plastic; many roots; strongly acid; clear, wavy boundary.

Ap2—3 to 10 inches, brown (10YR 4/3) silt loam; weak, medium and thick, platy structure; friable, nonsticky and slightly plastic; many roots; strongly acid; clear, wavy boundary.

B1—10 to 14 inches, yellowish-brown (10YR 5/4) silt loam; moderate, medium and fine, subangular blocky structure; firm, slightly sticky and plastic; many roots; strongly acid; clear, wavy boundary.

B21t—14 to 21 inches, yellowish-brown (10YR 5/4) silty clay loam; moderate fine and medium, angular blocky structure; very firm, sticky and plastic; common roots; thin continuous clay films; strongly acid; gradual, wavy boundary.

B22t—21 to 34 inches, brown (10YR 5/3) silty clay loam; many, medium, distinct, gray (5Y 6/1) and strong-brown (7.5YR 5/6) mottles; moderate, medium, angular blocky structure; very firm, sticky and plastic; few roots; thin continuous clay films; strongly acid; gradual, wavy boundary.

B3t—34 to 42 inches, strong-brown (7.5YR 5/6) silty clay; many, coarse, prominent, grayish-brown (2.5Y

5/2) mottles; moderate, medium, angular blocky structure; very firm, sticky and plastic; few roots; thin discontinuous clay films; 5 percent coarse fragments; strongly acid; gradual, wavy boundary.

Cg—42 to 60 inches, grayish-brown (2.5Y 5/2) silty clay; many, coarse, prominent, yellowish-brown (10YR 5/6) and dark grayish-brown (2.5Y 4/2) mottles; massive; very firm, sticky and plastic; 5 percent coarse fragments; very strongly acid.

The solum is 40 to 50 inches thick. The depth to bedrock is more than 4 feet.

The Ap horizons, when mixed, range from dark grayish brown (10YR 4/2) to brown (10YR 5/3) and contain as much as 10 percent coarse fragments. The B21t horizon ranges from yellowish brown (10YR 5/6) to brown (10YR 5/3). The B22t horizon ranges from yellowish brown (10YR 5/4) to grayish brown (2.5Y 5/2). The Bt horizons range from silty clay loam to silty clay and contain as much as 15 percent coarse fragments.

Wharton soils are near somewhat poorly drained Cavode soils. They are better drained than Cavode soils.

WhB—Wharton silt loam, 2 to 8 percent slopes. This nearly level and gently sloping soil is generally on ridgetops or in long contour areas on hillsides. It has the profie described as representative of the series. Slopes are slightly concave.

Included with this soil in mapping are small areas of Cavode, Ernest, Guernsey, and Gilpin soils and a soil that has less clay in the subsoil and is underlain by shale bedrock at a depth of about 3 feet. Erosion has exposed the subsoil in some areas.

Runoff is medium.

A seasonal high water table and slow permeability are limitations for community development and recreation use. The hazard of erosion and the seasonal high water table are limitations for cultivated crops. Drainage increases the suitability of the soil for crops. Conservation practices are needed to help control erosion. Capability unit IIe–3.

WhC—Wharton silt loam, 8 to 15 percent slopes. This sloping soil is generally in long, contour areas on hillsides. It has a profile similar to the one described as representative for the series, but the surface layer is 1 to 2 inches thinner.

Included with this soil in mapping are small areas of Ernest, Guernsey, and Gilpin soils and small areas of soils that have slopes of less than 8 percent or more than 15 percent. Also included is a soil that has less clay in the subsoil and is underlain by shale bedrock at a depth of about 3 feet.

Surface runoff is medium.

A seasonal high water table, slow permeability, and slope are limitations for community development and recreation use. The hazard of erosion and the seasonal high water table are limitations for cultivated crops. Drainage increases the suitability of the soil for crops. Conservation practices are needed to help control erosion. Capability unit IIIe–4.

WhD—Wharton silt loam, 15 to 25 percent slopes. This moderately steep soil is generally in long, contour areas on hillsides. It has a profile similar to the one described as representative of the series, but the surface layer is 1 to 2 inches thinner.

Included with this soil in mapping are small areas of Guernsey and Gilpin soils and small areas of soils that have slopes of less than 15 percent or more than 25 percent. Also included is a soil that has less clay in the subsoil and is underlain by shale bedrock at a depth of about 3 feet.

Runoff is rapid.

Moderately steep slopes, a seasonal high water table, and slow permeability are limitations for community development and recreation use. Slopes and a seasonal high water table are limitations for cultivated crops. Drainage increases the soil's suitability for crops. Conservation practices are needed to help control erosion. Capability unit IVe–4.

Use and Management of the Soils

This section discusses the properties of the soils and how they affect their use in engineering. It also discusses the use of the soils for town and country planning, recreation, wildlife habitat, woodland, and the suitability of the soils for crops and pasture.

Engineering Uses of the Soils [3]

This section is useful to planning commissions, town and city managers, land developers, engineers, contractors, farmers, and others who need information about soils used as structural material or as foundation on which structures are built.

Properties of soils highly important in engineering are permeability, strength, compaction characteristics, drainage, shrink-swell potential, grain size, plasticity, and reaction. Also important are depth to the water table, depth to bedrock, and slope. These properties, in various degrees and combinations, affect construction and maintenance of roads, airports, pipelines, foundations for small buildings, irrigation systems, ponds and small dams, and systems for disposal of sewage and refuse.

Information in this section of the soil survey can be helpful to those who—

1. Select potential residential, industrial, commercial, and recreational areas.
2. Evaluate alternate routes for roads, highways, pipelines, and underground cables.
3. Seek sources of gravel, sand, or clay.
4. Plan farm drainage systems, ponds, terraces, and other structures for controlling water and conserving soil.
5. Correlate performance of structures already built with properties of the soils on which they are built to help predict performance of structures on the same or similar kinds of soil in other locations.
6. Predict the trafficability of soils for cross-country movement of vehicles and construction equipment.
7. Develop preliminary estimates pertinent to construction in a particular area.

[3] JOHN W. MICKLEY, engineer, Soil Conservation Service, helped prepare this section.

Most of the information in this section is presented in tables. Table 2 shows estimates of several soil properties significant in engineering. Table 3 gives interpretations for various engineering uses. Table 4 shows results of engineering laboratory tests on soil samples.

This information, along with the soil map and other parts of this survey, can be used to make interpretations in addition to those given in tables 2 and 3, and it also can be used to make useful maps.

This information, however, does not eliminate need for further investigations at sites selected for engineering works, especially works that involve heavy loads or that require excavations to depths greater than those shown in the tables, generally depths of more than 5 feet. Also, inspection of sites, especially the small ones, is needed because many mapped areas of a given soil can include small areas of other kinds of soil that have strongly contrasting properties and different suitability or limitations for soil engineering.

Some of the terms used in this soil survey have special meaning to soil scientists. The Glossary defines many of these terms.

Engineering soil classification systems

The two systems most commonly used in classifying samples of soils for engineering are the Unified system (*3*), used by SCS engineers, the Department of Defense, and others, and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO) (*2*).

In the Unified system, soils are classified according to particle-size distribution, plasticity, liquid limit, and organic matter. Soils are grouped in 15 classes. There are eight classes of coarse-grained soils, identified as GW, GP, GM, GC, SW, SP, SM, and SC; six classes of fine-grained soils, identified as ML, CL, OL, MH, CH, and OH; and one class of highly organic soils, identified as Pt. Soils on the borderline between two classes are designated by symbols for both classes; for example, CL-ML.

The AASHTO system is used to classify soils according to properties that affect their use in highway construction and maintenance. In this system, a soil is placed in one of seven basic groups ranging from A–1 through A–7 on the basis of grain-size distribution, liquid limit, and plasticity index. In group A–1 are gravelly soils of high bearing strength, or the best soils for subgrade (foundation). At the other extreme, in group A–7, are clay soils that have low strength when wet and that are the poorest soils for subgrade. Where laboratory data are available to justify a further breakdown, the A–1, A–2, and A–7 groups are divided as follows: A–1–a, A–1–b, A–2–4, A–2–5, A–2–6, A–2–7, A–7–5, and A–7–6. As additional refinement, the engineering value of a soil material can be indicated by a group index number. Group indexes range from 0 for the best material to 20 for the poorest. The AASHTO classification for tested soils, with group index numbers in parentheses, is shown in table 4; the estimated classification, without group index numbers, is given in table 2 for all soils mapped in the survey area.

Soil properties significant in engineering

Several estimated soil properties significant in engineering are given in table 2. These estimates are made for typical soil profiles, by layers sufficiently different to have different significance for soil engineering. The estimates are based on field observations made in the course of mapping, on test data for these and similar soils, and on experience with the same kinds of soil in other counties. Following are explanations of some of the columns in table 2.

Depth to seasonal high water table is distance from the surface of the soil to the highest level that ground water reaches in the soil in most years.

Depth to bedrock is distance from the surface of the soil to the rock layer.

Soil texture is described in the standard terms used by the U.S. Department of Agriculture (*10*). These terms take into account relative percentages of sand, silt, and clay in soil material that is less than 2 millimeters in diameter. "Loam," for example, is soil material that contains 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the soil contains gravel or other particles coarser than sand, an appropriate modifier is added, for example, "gravelly loamy sand." "Sand," "silt," "clay," and some of the other terms used are defined in the Glossary of this soil survey.

Permeability is that quality of a soil that enables it to transmit water or air. It is estimated on the basis of those soil characteristics observed in the field, particularly structure and texture. The estimates do not take into account lateral seepage or such transient soil features as plowpans and surface crusts.

Available water capacity is the ability of soils to hold water for use by most plants. It is commonly defined as the difference between the amount of water in the soil at field capacity and the amount at the wilting point of most crop plants.

Reaction is the degree of acidity or alkalinity of a soil, expressed in pH values. The pH value and terms used to describe soil reaction are explained in the Glossary.

Compaction (or moisture-density) data are important in earthwork. If a soil material is compacted at a successively higher moisture content, assuming that the compactive effort remains constant, the density of the compacted material increases until the *optimum moisture content* is reached. After that, density decreases with increase in moisture content. The highest dry density obtained in the compactive test is termed *maximum dry density*. As a rule, maximum strength of earthwork is obtained if the soil is compacted to the maximum dry density.

Shrink-swell potential is the relative change in volume of soil material to be expected with changes in moisture content, that is, the extent to which the soil shrinks as it dries out or swells when it gets wet. Extent of shrinking and swelling is influenced by the amount and kind of clay in the soil. Shrinking and swelling of soils cause much damage to building foundations, roads, and other structures. A *high* shrink-swell potential indicates a hazard to the maintenance of structures built in, on, or with material having this rating.

TABLE 2.—*Estimated soil properties*

[An asterisk in the first column indicates that at least one mapping unit in that series is made up of two or more kinds of soil. in the first column of this table. Dumps (Du and Dw), Gullied land (Gx), Strip mines (SmB, SmD, and SmF), Urban land (UB) and the table because their properties are too variable to be estimated. The symbol > means more than]

Soil series and map symbols	Depth to—		Depth from surface	USDA texture	Engineering classification		Coarse fraction larger than 3 inches
	Seasonal high water table	Bedrock [1]			Unified	AASHTO	
	Feet	*Feet*	*Inches*				*Percent*
Allegheny variant: AgB, AgC	>6	>5	0–8	Silt loam	ML or CL	A–4 or A–6	———
			8–35	Silt loam, gravelly loam, gravelly sandy loam.	SM, GC, ML, or CL	A–4 or A–6	0–10
			35–60	Very gravelly loamy sand.	GM, GC, SM, or SC	A–1 or A–2	0–20
Atkins: At	0–½	>5	0–8	Silt loam	ML or CL	A–4 or A–6	———
			8–34	Silt loam, loam	ML or CL	A–4 or A–6	———
			34–60	Loam, silty clay loam	SM, SC, ML, or CL	A–2 or A–4	———
Brinkerton: BrB	0–½	>5	0–8	Silt loam	ML or CL	A–4 or A–6	———
			8–24	Silty clay loam	ML or CL	A–4, A–6, or A–7	———
			24–60	Silty clay loam	SM, SC, ML, or CL	A–4, A–6, or A–7	———
Cavode: CaB, CaC	½–1½	>3½	0–10	Silt loam	ML or CL	A–4 or A–6	———
			10–40	Silty clay loam, silty clay.	ML, CL, or MH	A–4, A–6, or A–7	———
			40–60	Shaly silty clay	ML or CL	A–4 or A–6	0–20
Clarksburg: CkB, CkC	1½–3	>5	0–9	Silt loam	ML	A–4	———
			9–28	Silty clay loam	ML or CL	A–4 or A–6	———
			28–60	Silt loam	ML or CL	A–4 or A–6	———
Clymer: CmB, CmC, CmD	>6	3½–6	0–9	Silt loam	ML	A–4	———
			9–37	Loam, clay loam, channery sandy clay loam.	SM, GM or ML	A–2 or A–4	0–15
			37–55	Very channery loamy sand.	GM, SM, GP, or GM	A–1 or A–2	0–20
			55	Sandstone bedrock			
*Culleoka: CuB, CuC, CuD, CwB, CwC, CwD. For the Weikert part of CwB, CwC, and CwD, see the Weikert series.	>6	1½–3½	0–7	Silt loam	ML	A–4 or A–6	———
			7–27	Silt loam, silty channery clay loam, clay loam.	GM, GC, SM, SC, ML, or CL	A–4 or A–6	0–15
			27–29	Very channery clay loam.	GM or GW	A–1, A–2, or A–4	5–15
			29	Shale and sandstone bedrock.			
Dormont: DoB, DoC, DoD, DoE	1½–3	>4	0–7	Silt loam	ML or CL	A–4 or A–6	———
			7–53	Silt loam, silty clay loam.	ML or CL	A–4 or A–6	———
			53–72	Silty clay	ML or CL	A–6 or A–7	0–30
*Ernest: ErB, ErC, ErD, EvB, EvC, EvD. For the Vandergrift part of EvB, EvC, and EvD, see the Vandergrift series.	1½–3	>5	0–6	Silt loam	ML or CL	A–4	———
			6–28	Silt loam, silty clay loam.	ML or CL	A–4 or A–6	0–20
			28–72	Silt loam	GM, GC, ML, SM, SC, or CL	A–4 or A–6	0–20

significant in engineering

The soils in such mapping units may have different properties, and for this reason it is necessary to refer to other series as indicated the Urban land part of UCB, UCD, UCE, UGB, UGD, URB, URC, UWB, and UWD, and the Rock outcrop part of WEF are not listed in

Percentage smaller than 3 inches passing sieve—				Permeability	Available water capacity [2]	Reaction	Compaction data		Shrink-swell potential	Corrosion potential	
No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)				Optimum moisture	Maximum dry density		Uncoated steel	Concrete
				Inches per hour	*Inches per inch of soil*	*pH*	*Percent*	*Pounds per cubic foot*			
95–100	95–100	85–100	70–90	2.0–6.0	0.18–0.24	4.5–5.5			Low	Low	High.
80–100	60–100	55–100	45–75	0.6–2.0	0.12–0.18	4.5–5.5	10–15	100–125	Low	Low	High.
40–80	30–60	25–50	15–30	0.6–6.0	0.08–0.12	4.5–5.5	5–10	105–130	Low	Low	High.
90–100	80–100	80–100	75–95	0.6–2.0	0.18–0.22	4.5–6.0			Low	High	High.
90–100	80–100	80–100	60–95	0.6–2.0	0.14–0.18	4.5–5.5	12–18	100–110	Low	High	High.
80–100	60–100	45–100	30–85	0.6–6.0	0.08–0.16	4.5–5.5	8–14	108–120	Low	High	High.
95–100	85–95	80–95	75–95	0.2–6.0	0.18–0.24	5.1–6.0			Low	High	Moderate.
95–100	85–100	80–100	65–95	0.2–0.6	0.14–0.18	5.1–6.0	16–22	95–112	Moderate	High	Moderate.
70–100	60–100	55–95	40–90	0.06–0.2	0.08–0.12	5.1–6.0	12–17	100–120	Moderate	High	Moderate.
90–100	85–100	80–95	75–95	0.6–2.0	0.18–0.24	5.1–6.0			Low	High	Moderate.
80–100	75–100	70–95	65–95	0.06–0.2	0.10–0.14	4.5–5.5	15–18	95–110	Moderate	High	High.
80–100	75–95	70–95	65–90	0.06–0.2	0.08–0.12	4.5–5.5	12–15	110–120	Moderate	High	High.
95–100	85–95	70–90	55–85	0.6–6.0	0.18–0.24	5.1–6.0			Low	Moderate	Moderate.
80–100	70–95	60–90	55–85	0.6–2.0	0.12–0.16	5.1–6.0	15–18	100–115	Moderate	High	Moderate.
80–100	70–95	60–90	55–85	0.06–0.2	0.08–0.12	5.1–6.0	12–17	115–120	Moderate	Moderate	Moderate.
85–100	75–90	70–85	60–85	2.0–6.0	0.14–0.20	4.5–6.0			Low	Low	High.
60–85	55–85	50–75	30–60	2.0–6.0	0.10–0.14	4.5–5.5	11–16	115–123	Low	Moderate	High.
40–70	20–65	20–40	10–20	2.0–6.0	0.04–0.08	4.5–5.5	10–14	116–122	Low	Low	High.
85–100	35–95	70–95	60–85	0.6–6.0	0.18–0.24	5.1–6.0			Low	Low	Moderate.
50–100	45–95	45–95	40–85	0.6–2.0	0.12–0.18	5.1–6.0	12–17	108–118	Low	Moderate	Moderate.
25–50	20–45	15–40	10–40	0.6–2.0	0.06–0.10	5.1–6.0	10–15	115–125	Low	Low	Moderate.
95–100	90–100	85–95	80–90	0.6–2.0	0.14–0.18	5.1–6.0			Low	High	Moderate.
90–100	60–100	80–95	55–90	0.06–0.2	0.14–0.18	5.1–6.0	12–18	100–115	Moderate	High	Low.
80–100	60–100	75–100	55–100	0.06–0.2	0.08–0.12	5.6–6.0	12–16	95–110	Moderate	High	Low.
90–100	85–100	85–100	70–95	0.6–6.0	0.18–0.24	5.1–6.5			Low	Moderate	High.
90–100	85–100	85–100	70–95	0.6–2.0	0.12–0.16	4.5–5.5	15–19	102–112	Moderate	High	High.
85–95	80–90	50–75	40–70	0.06–0.2	0.08–0.12	4.5–5.5	12–17	114–120	Moderate	Moderate	High.

TABLE 2.—*Estimated soil properties*

Soil series and map symbols	Depth to—		Depth from surface	USDA texture	Engineering classification		Coarse fraction larger than 3 inches
	Seasonal high water table	Bedrock [1]			Unified	AASHTO	
	Feet	*Feet*	*Inches*				*Percent*
*Gilpin: GlB, GlC, GlD, GpB, GpC, GpD, GQF, GrE, GSF. For the Upshur part of GpB, GpC, GpD, and GQF, see the Upshur series. For the Vandergrift part of GrE, see the Vandergrift series. For the Weikert and Culleoka parts of GSF, see the Weikert and Culleoka series.	>6	1½–3½	0–5	Silt loam	ML	A–4	———
			5–23	Shaly silt loam	GM, SM, ML, or CL	A–4 or A–6	0–10
			23–31	Very shaly loam	GM, SM, or ML	A–1, A–2, or A–4	10–30
			31	Shale bedrock.			
*Guernsey: GuB, GuC, GuD, GvB, GvC, GvD. For the Vandergrift part of GvB, GvC, and GvD, see the Vandergrift series.	1–2	>4	0–7	Silt loam	ML or CL	A–4 or A–6	———
			7–38	Silty clay loam, silty clay, clay.	ML, CL, or CH	A–4, A–6, or A–7	———
			38–50	Shaly silt loam	ML, CL, or CH	A–4, A–6, or A–7	0–20
Hazleton: HaB, HaC, HaD, HTE	>6	3½–6	0–6	Loam	GM, SM, or ML	A–2 or A–4	0–20
			6–28	Channery sandy loam	GM, SM, or ML	A–2 or A–4	0–40
			28–60	Very channery loamy sand.	GM or SM	A–1, A–2, or A–4	0–40
			60	Sandstone bedrock.			
Huntington: Hu	>4	>5	0–20	Silt loam	ML	A–4	———
			20–48	Silt loam	ML	A–4	———
			48–60	Sandy loam	SM or ML	A–2 or A–4	———
Library: LbB, LbC, LbD	½–1½	3½–6	0–8	Silty clay loam	ML or CL	A–4 or A–6	———
			8–25	Silty clay	ML, CL, MH, or CH	A–6 or A–7	———
			25–54	Shaly silty clay loam, shaly loam.	ML, SM, MH or GC	A–6 or A–7	0–15
Lindside: Ln	1½–3	>5	0–8	Silt loam	ML	A–4	———
			8–38	Silt loam	ML	A–4	———
			38–60	Loam	SM or ML	A–2 or A–4	———
Newark: Ne	0–1	>5	0–9	Silt loam	ML or CL	A–4 or A–6	———
			9–34	Silty clay loam, silt loam.	ML or CL	A–4 or A–6	———
			34–60	Loam stratified with silt loam.	ML or CL	A–4 or A–6	———
Philo: Ph	1½–3	>5	0–9	Silt loam	ML or CL	A–4	———
			9–34	Silt loam	ML	A–4	———
			34–60	Loam, sandy loam	SM or ML	A–4	———
Rainsboro: RaA, RaB, RaC	1½–3	>5	0–13	Silt loam	ML	A–4	———
			13–26	Silt loam	ML or CL	A–4 or A–6	———
			26–65	Silt loam, sandy clay loam, loam.	SM or ML	A–4	———
Rayne: RyB, RyC	>6	3½–5	0–8	Silt loam	ML or CL	A–4	———
			8–33	Silt loam, silty clay loam.	ML or CL	A–4 or A–6	0–20
			33–46	Shaly loam, very shaly loam.	GM, GC, SM, or SC	A–2 or A–4	0–30
			46	Shale bedrock.			
Upshur: UaB, UaC	>3	4–6	0–6	Silty clay loam	CL or ML	A–4 or A–6	———
			6–31	Clay, shaly silty clay	CL, MH, or CH	A–6 or A–7	———
			31–64	Shaly silty clay, very shaly silty clay.	CL, GC, or SC	A–4, A–6, or A–7	0–40

significant in engineering—Continued

Percentage smaller than 3 inches passing sieve—				Permeability	Available water capacity [2]	Reaction	Compaction data		Shrink-swell potential	Corrosion potential	
No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)				Optimum moisture	Maximum dry density		Uncoated steel	Concrete
				Inches per hour	*Inches per inch of soil*	*pH*	*Percent*	*Pounds per cubic foot*			
85–100	70–90	65–85	55–85	0.6–6.0	0.18–0.24	4.5–5.5			Low	Low	High.
50–95	45–90	35–80	35–70	0.6–2.0	0.10–0.14	4.5–5.5	13–15	110–120	Low	Moderate	High.
40–70	20–65	20–60	15–55	0.6–2.0	0.06–0.10	4.5–5.5	11–14	114–125	Low	Low	High.
95–100	90–100	90–100	85–100	0.6–2.0	0.14–0.18	5.6–6.5			Moderate	High	Low.
95–100	75–100	85–100	65–100	0.06–0.2	0.10–0.14	5.6–7.3	15–20	95–110	High	High	Low.
80–100	80–100	75–100	65–100	0.06–0.2	0.08–0.12	5.6–7.3	15–20	95–115	High	High	Low.
80–90	75–90	35–65	15–55	2.0–6.0	0.12–0.16	4.5–5.5			Low	Low	High.
50–85	45–80	40–75	20–55	2.0–6.0	0.08–0.12	4.5–5.5	10–15	115–123	Low	Low	High.
45–85	40–80	35–65	15–45	2.0–6.0	0.04–0.08	4.5–5.5	9–13	115–125	Low	Low	High.
95–100	90–100	85–100	65–100	0.6–2.0	0.18–0.24	6.1–7.3			Low	Low	Low.
95–100	90–100	85–100	65–100	0.6–2.0	0.16–0.20	5.6–6.5	12–18	100–110	Low	Low	Low.
85–100	60–100	50–70	30–65	2.0–6.0	0.10–0.14	5.6–6.5	10–16	105–120	Low	Low	Low.
95–100	85–100	85–100	80–100	0.6–2.0	0.14–0.18	5.1–6.5			Moderate	High	Moderate.
95–100	85–100	85–100	80–100	0.06–0.2	0.10–0.14	4.5–7.3	17–24	95–105	High	High	Low.
80–100	45–100	40–100	35–95	0.06–0.2	0.08–0.12	4.5–7.3	13–20	90–117	High	High	Low.
100	95–100	90–100	70–80	0.6–6.0	0.18–0.24	6.1–7.3			Low	Low	Low.
100	95–100	80–95	80–90	0.6–2.0	0.18–0.24	5.6–7.3	12–18	100–110	Low	Moderate	Low.
100	95–100	90–100	30–90	0.6–6.0	0.14–0.20	5.6–7.3	10–16	105–120	Low	Moderate	Low.
90–100	90–100	85–100	75–95	0.6–2.0	0.18–0.22	5.6–7.3			Low	High	Low.
90–100	90–100	85–100	65–90	0.6–2.0	0.18–0.22	5.6–7.3	12–18	100–112	Moderate	High	Low.
90–100	90–100	80–100	60–80	0.6–2.0	0.12–0.18	6.1–7.3	12–18	100–112	Low	High	Low.
65–100	65–100	60–80	55–75	0.6–2.0	0.14–0.18	5.1–6.0			Low	Low	Moderate.
65–100	65–100	60–80	55–75	0.6–2.0	0.14–0.18	4.5–5.5	10–14	110–120	Low	Moderate	High.
60–95	55–95	55–75	45–65	2.0–6.0	0.08–0.10	4.5–5.5	8–12	115–122	Low	Moderate	High.
95–100	95–100	85–100	65–90	0.6–2.0	0.18–0.24	5.1–6.5			Low	Moderate	Moderate.
95–100	95–100	85–100	65–90	0.6–2.0	0.14–0.18	5.1–6.0	12–18	110–116	Moderate	High	Moderate.
80–100	75–100	60–95	45–90	0.06–0.2	0.10–0.12	5.1–6.0	10–16	110–122	Low	Moderate	Moderate.
95–100	90–100	80–95	60–85	0.6–2.0	0.14–0.18	4.5–6.0			Low	Low	High.
85–100	60–100	60–95	55–95	0.6–2.0	0.12–0.16	4.5–5.5	12–16	113–120	Low	Moderate	Moderate.
40–75	25–70	25–60	10–50	2.0–6.0	0.08–0.12	4.5–5.5	11–15	113–125	Low	Low	Moderate.
95–100	90–100	80–95	70–95	0.2–0.6	0.14–0.20	5.1–6.5			Moderate	High	Moderate.
95–100	90–100	80–95	70–95	0.06–0.2	0.10–0.14	5.6–7.8	18–22	100–110	High	High	Low.
60–95	40–95	40–90	35–85	0.06–0.2	0.08–0.12	5.6–7.8	15–18	110–115	High	High	Low.

TABLE 2.—*Estimated soil properties*

Soil series and map symbols	Depth to—		Depth from surface	USDA texture	Engineering classification		Coarse fraction larger than 3 inches
	Seasonal high water table	Bedrock[1]			Unified	AASHTO	
	Feet	*Feet*	*Inches*				*Percent*
*Urban land. Properties are too variable to be estimated. For the Culleoka part of UCB, UCD, and UCE, see the Culleoka series. For the Guernsey part of UGB and UGD, see the Guernsey series. For the Rainsboro part of URB, and URC, see the Rainsboro series. For the Wharton part of UWB and UWD see the Wharton series.							
Vandergrift	1–2	>5	0–8	Silt loam	ML or CL	A–4 or A–6	-----
Mapped only in complexes with Ernest, Gilpin, and Guernsey soils.			8–42	Silty clay loam, silty clay.	CL, MH, or CH	A–6 or A–7	0–5
			42–60	Clay, channery silty clay loam.	CL	A–6 or A–7	0–5
Weikert: WEF	>6	1–1½	0–6	Shaly silt loam	GM, SM, or ML	A–1, A–2, or A–4	0–10
Rock outcrop part of WEF not rated.			6–15	Very shaly silt loam, very shaly loam.	GW, GM, SW, or SM	A–1 or A–2	0–20
			15	Shale bedrock.			
Wharton: WhB, WhC, WhD	1½–3	>4	0–10	Silt loam	ML or CL	A–4 or A–6	-----
			10–42	Silt loam, silty clay loam, silty clay.	ML, CL, or MH	A–4, A–6, or A–7	-----
			42–60	Silty clay	ML, CL, or MH	A–4, A–6, or A–7	0–20

[1] Bedrock is generally rippable with light power equipment, such as backhoes. In areas of Clymer, Weikert, and Hazleton soils, bedrock is normally rippable to a depth of at least 5 feet. The bedrock under other soils is generally rippable to a depth of at least 8 feet.

Corrosion potential or corrosivity pertains to potential soil-induced chemical action that dissolves or weakens uncoated steel or concrete. Rate of corrosion of uncoated steel is related to soil properties such as drainage, texture, total acidity, and electrical conductivity of the soil material. Ratings of soils for corrosivity for concrete are based mainly on soil texture and acidity. Installations of uncoated steel that intersect soil boundaries or soil horizons are more susceptible to corrosion than installations entirely in one kind of soil or in one soil horizon. A corrosivity rating of *low* means that there is a low probability of soil-induced corrosion damage. A rating of *high* means that there is a high probability of damage, so that protective measures for steel and more resistant concrete should be used to avoid or minimize damage.

Engineering interpretations of soils

The estimated interpretations in table 3 are based on the engineering properties of soils shown in table 2, on test data for soils in this survey area and others nearby or adjoining, and on the experience of engineers and soil scientists with the soils of Allegheny County. In table 3, ratings are used to summarize suitability of the soils as a source of topsoil, sand and gravel, and road fill. For all other uses, soil features are listed that are not to be overlooked in planning, installation, and maintenance.

Soil suitability is rated by the terms *good, fair,* and *poor. Good* means soil properties generally are favorable for the given use or, in other words, the limitations are minor and easily overcome. *Fair* means that some soil properties are unfavorable but can be overcome or modified by special planning and design. *Poor* means soil properties are so unfavorable and so difficult to correct or overcome that major soil reclamation, special designs, or intensive maintenance are required.

Following are explanations of some of the column headings in table 3:

Topsoil is used for topdressing an area where vegetation is to be established and maintained. Suitability is affected mainly by ease of working and spreading the soil material, as in preparing a seedbed; natural fertility of the material or plant response when fertilizer is applied; and absence of substances toxic to plants. Texture of the soil material and its content of stone fragments affect suitability, and also considered

significant in engineering—Continued

Percentage smaller than 3 inches passing sieve—				Permeability	Available water capacity [2]	Reaction	Compaction data		Shrink-swell potential	Corrosion potential	
No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)				Optimum moisture	Maximum dry density		Uncoated steel	Concrete
				Inches per hour	*Inches per inch of soil*	*pH*	*Percent*	*Pounds per cubic foot*			
95–100	90–100	85–100	80–100	0.6–2.0	0.16–0.20	5.1–6.0			Moderate	High	Moderate.
90–100	90–100	80–100	75–100	0.06–0.2	0.10–0.16	5.1–7.3	15–22	100–115	High	High	Low.
80–100	55–95	55–95	50–95	0.06–0.2	0.08–0.12	5.6–7.3	14–20	100–115	High	High	Low.
30–70	25–65	25–60	20–55	2.0–6.0	0.08–0.14	4.5–5.5			Low	Low	High.
10–60	10–55	10–35	5–35	2.0–6.0	0.04–0.08	4.5–6.0	10–15	110–125	Low	Low	High.
95–100	85–100	80–95	70–90	0.6–2.0	0.18–0.24	5.1–6.0			Low	High	Moderate.
85–100	75–100	70–100	65–95	0.06–0.2	0.14–0.18	4.5–5.5	16–22	95–112	Moderate	High	High.
80–100	75–100	55–100	55–100	0.06–0.2	0.08–0.12	4.5–5.5	14–18	109–118	Moderate	High	High.

[2] Roots of most plants are restricted in fragipans or dense layers.

in the ratings is damage that can result at the area from which topsoil is taken.

Sand and gravel are used in great quantities in many kinds of construction. The ratings provide guidance about where to look for probable sources. A soil rated as a *good* or *fair* source generally a layer of sand or gravel at least 3 feet thick, the top of which is within a depth of 6 feet. The ratings do not take into account thickness of overburden, location of the water table, or other factors that affect mining of the materials, and neither do they indicate quality of the deposit.

Road fill is soil material used in embankments for roads. The suitability ratings reflect the predicted performance of soil after it has been placed in an embankment that has been properly compacted and provided with adequate drainage and the relative ease of excavating the material at borrow areas.

Highway and road location are affected most by road-supporting capacity of the soils, stability of the subgrade, and the workability and quantity of cut and fill material available. The AASHTO and Unified classifications of the soil material and the shrink-swell potential indicate traffic supporting capacity. Wetness (fig. 14) and flooding affect stability of the material.

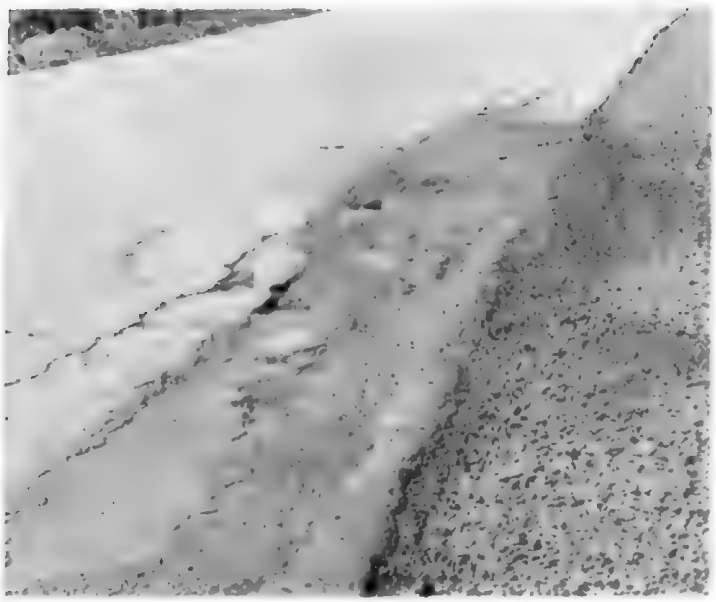


Figure 14.—This pavement on Ernest silt loam has been damaged by a seasonal high water table and frost heave.

TABLE 3.— *Soil interpretations*

[An asterisk in the first column indicates that at least one mapping unit in that series is made up of two or more kinds of soil. series as indicated in the first column of this table. Dumps (Du and Dw), Gullied land (Gx), Strip mines (SmB, SmD, and SmF), WFE are not listed in the table because their properties are too variable for interpretations to be made]

Soil series and map symbols	Suitability as a source of—			Soil features affecting—	
	Topsoil	Sand and gravel	Road fill	Highway and road location	Ponds: Reservoir areas
Allegheny variant: AgB, AgC	Fair	Fair	Good	Erodible; moderate potential frost action.	Pervious gravel in underlying material.
Atkins: At	Poor	Unsuitable	Poor	High water table; hazard of flooding; high potential frost action.	High water table; pervious layers in underlying material; hazard of flooding.
Brinkerton: BrB	Poor	Unsuitable	Poor	High water table; seepage on top of fragipan; erodible; high potential frost action.	Pervious layers in underlying material in places.
Cavode: CaB, CaC	Fair	Unsuitable	Poor	Seasonal high water table; highly plastic subsoil; erodible; high potential frost action.	Low seepage losses
Clarksburg: CkB, CkC	Fair	Unsuitable	Poor	Seasonal high water table; seepage on top of fragipan; erodible; high potential frost action.	Pervious layers in underlying material in places.
Clymer: CmB, CmC, CmD	Fair to poor.	Poor	Good	Weathered bedrock at a depth of 3½ to 6 feet; erodible; moderate potential frost action.	Pervious soil and underlying material.
*Culleoka: CuB, CuC, CuD, CwB, CwC, CwD. For the Weikert part of CwB, CwC, and CwD, see the Weikert series.	Fair to poor.	Unsuitable	Fair	Bedrock at a depth of 1½ to 3½ feet; erodible; moderate potential frost action.	Weathered and fractured bedrock at a depth of 1½ to 3½ feet.
Dormont: DoB, DoC, DoD, DoE	Fair to poor.	Unsuitable	Poor: landslide prone.	Seasonal high water table; landslide prone on fill slopes; erodible; high potential frost action.	Low seepage losses
*Ernest: ErB, ErC, ErD, EvB, EvC, EvD For the Vandergrift part of EvB, EvC, and EvD, see the Vandergrift series.	Fair to poor.	Unsuitable	Poor	Seasonal high water table; seepage on top of fragipan; erodible; high potential frost action.	Pervious layers in underlying material in places.

for engineering uses

The soils in such mapping units may have different properties and limitations, and for this reason it is necessary to refer to other Urban land (UB) and the Urban land part of UCB, UCD, UCE, UGB, UGD, URB, URC, UWB, and UWD, and the Rock outcrop part of

	Soil features affecting—Continued				
Ponds—Continued Embankments	Drainage for crops and pasture	Terraces or diversions	Grassed waterways	Winter grading	Pipeline construction and maintenance
Medium to low shear strength, compressibility, and permeability.	Well drained	No unfavorable features.	No unfavorable features.	No unfavorable features.	Prone to caving.
Medium to low shear strength, compressibility, and permeability; high water table.	Hazard of flooding; high water table; outlet difficult to locate.	High water table	High water table	High water table; hazard of flooding.	High water table; hazard of flooding; prone to caving.
Medium to low shear strength, compressibility, and permeability.	Slow permeability in fragipan; high water table.	High water table; slowly permeable fragipan at a depth of 20 to 30 inches.	High water table; slowly permeable fragipan at a depth of 20 to 30 inches.	High water table	High water table.
Highly plastic; low to medium shear strength; medium to high compressibility; low permeability.	Slow permeability; seasonal high water table.	Seasonal high water table; slow permeability in subsoil.	Seasonal high water table; slow permeability in subsoil.	Seasonal high water table; clayey subsoil.	Seasonal high water table; clayey subsoil.
Medium to low shear strength; medium compressibility; low to medium permeability.	Slow permeability in fragipan; seasonal high water table.	Seasonal high water table; slowly permeable fragipan at a depth of 20 to 30 inches.	Seasonal high water table; slowly permeable fragipan at a depth of 20 to 30 inches.	Seasonal high water table.	Seasonal high water table.
High to medium shear strength; low to medium compressibility; medium to low permeability.	Well drained	No unfavorable features.	No unfavorable features.	No unfavorable features.	Weathered bedrock at a depth of 3½ to 6 feet.
Bedrock at a depth of 1½ to 3½ feet; medium to high shear strength; medium to low compressibility and permeability.	Well drained	Bedrock at a depth of 1½ to 3½ feet.	Bedrock at a depth of 1½ to 3½ feet.	No unfavorable features.	Bedrock at a depth of 1½ to 3½ feet.
Steep slopes prone to landslide; medium to low shear strength; medium compressibility; low to medium permeability.	Seasonal high water table; slow permeability.	Seasonal high water table; slow permeability in subsoil; landslide prone on fill slopes.	Seasonal high water table; slow permeability in subsoil.	Seasonal high water table.	Seasonal high water table.
Medium to low shear strength; medium compressibility; low to medium permeability.	Seasonal high water table; slow permeability in fragipan.	Seasonal high water table; slow permeability in fragipan at a depth of 20 to 30 inches.	Seasonal high water table; slow permeability in fragipan at a depth of 20 to 30 inches.	Seasonal high water table.	Seasonal high water table.

TABLE 3.— *Soil interpretations*

Soil series and map symbols	Suitability as a source of—			Soil features affecting—	
	Topsoil	Sand and gravel	Road fill	Highway and road location	Ponds: Reservoir areas
*Gilpin: GlB, GlC, GlD, GpB, GpC, GpD, GQF, GrE, GSF. For the Upshur part of GpB, GpC, GpD, and GQF, see the Upshur series. For the Vandergrift part of GrE, see the Vandergrift series. For the Weikert and Culleoka parts of GSF, see the Weikert and Culleoka series.	Fair to poor.	Unsuitable	Fair	Pervious bedrock at a depth of 1½ to 3½ feet; erodible; moderate potential frost action.	Bedrock at a depth of 1½ to 3½ feet.
*Guernsey: GuB, GuC, GuD, GvB, GvC, GvD. For the Vandergrift part of GvB, GvC, and GvD, see the Vandergrift series.	Fair to poor.	Unsuitable	Poor: landslide prone.	Seasonal high water table; landslide prone on fill slopes; highly plastic subsoil; erodible; high potential frost action.	Low seepage losses.
Hazleton: HaB, HaC, HaD, HTE	Poor	Poor	Good	Bedrock at a depth of 3½ to 6 feet; erodible; moderate potential frost action.	Pervious soil in underlying material.
Huntington: Hu	Good	Unsuitable	Fair	Hazard of flooding; moderate potential frost action.	Pervious layers in underlying material; hazard of flooding.
Library: LbB, LbC, LbD	Fair to poor.	Unsuitable	Poor: landslide prone.	Seasonal high water table; landslide prone on fill slopes; highly plastic subsoil; erodible; high potential frost action.	Low seepage losses.
Lindside: Ln	Good	Unsuitable	Poor	Seasonal high water table; hazard of flooding; high potential frost action.	Pervious layers in underlying material; hazard of flooding.
Newark: Ne	Poor	Unsuitable	Poor	Hazard of flooding; high water table; high potential frost action.	High water table; pervious layers in underlying material; hazard of flooding.
Philo: Ph	Good	Unsuitable	Poor	Seasonal high water table; hazard of flooding; high potential frost action.	Pervious layers in underlying material; hazard of flooding.
Rainsboro: RaA, RaB, RaC	Fair	Unsuitable; fair below solum depth in some areas.	Poor	Seasonal high water table; seepage on top of fragipan: erodible; high potential frost action.	Pervious layers in underlying material.
Rayne: RyB, RyC	Fair	Unsuitable	Fair	Bedrock at a depth of 3½ to 5 feet; erodible; moderate potential frost action	Pervious bedrock at depth of 3½ to 5 feet.

for engineering uses—Continued

	Soil features affecting—Continued				
Ponds—Continued Embankments	Drainage for crops and pasture	Terraces or diversions	Grassed waterways	Winter grading	Pipeline construction and maintenance
Bedrock at a depth of 1½ to 3½ feet; medium to high shear strength; medium to low compressibility, and permeability.	Well drained	Bedrock at a depth of 1½ to 3½ feet.	Bedrock at a depth of 1½ to 3½ feet.	No unfavorable features.	Weathered bedrock at a depth of 1½ to 3½ feet.
Highly plastic; steep slopes; prone to landslide; medium to low shear strength; medium to high compressibility; low permeability.	Seasonal high water table; slow permeability.	Seasonal high water table; slow permeability in subsoil; landslide prone on fill slopes.	Seasonal high water table; slow permeability in subsoil.	Seasonal high water table; clayey subsoil.	Seasonal high water table; clayey subsoil.
High to medium shear strength; low to medium compressibility; medium to low permeability.	Well drained	No unfavorable features.	No unfavorable features.	No unfavorable features.	Bedrock at a depth of 3½ to 6 feet.
Medium to low shear strength, compressibility, and permeability.	Well drained; hazard of flooding.	No unfavorable features.	No unfavorable features.	Hazard of flooding	Hazard of flooding; prone to caving.
Highly plastic; steep slopes prone to landslide; low to medium shear strength; medium to high compressibility; low permeability.	Seasonal high water table; slow permeability.	Seasonal high water table; slow permeability in subsoil; landslide prone on fill slopes.	Seasonal high water table; slow permeability in subsoil.	Seasonal high water table; clayey subsoil.	Seasonal high water table; clayey subsoil.
Medium to low shear strength, compressibility, and permeability.	Seasonal high water table; hazard of flooding; outlets difficult to locate.	Seasonal high water table.	Seasonal high water table.	Seasonal high water table; hazard of flooding.	Seasonal high water table; hazard of flooding; prone to caving.
Medium to low shear strength, compressibility, and permeability; high water table.	Hazard of flooding; high water table; outlets difficult to locate.	High water table	High water table	High water table; hazard of flooding.	High water table; hazard of flooding; prone to caving.
Medium to low shear strength, compressibility, and permeability.	Seasonal high water table; outlets difficult to locate; hazard of flooding.	Seasonal high water table.	Seasonal high water table.	Seasonal high water table; hazard of flooding.	Seasonal high water table; hazard of flooding; prone to caving.
Medium to low shear strength; medium compressibility; medium to low permeability.	Seasonal high water table; slow permeability in fragipan at a depth of 20 to 30 inches.	Seasonal high water table; slow permeability in fragipan at a depth of 20 to 30 inches.	Seasonal high water table; slow permeability in fragipan at a depth of 20 to 30 inches.	Seasonal high water table.	Seasonal high water table; prone to caving.
Medium to low shear strength, compressibility, and permeability.	Well drained	No unfavorable features.	No unfavorable features.	No unfavorable features.	Bedrock at a depth of 3½ to 5 feet.

TABLE 3.— *Soil interpretations*

Soil series and map symbols	Suitability as a source of—			Soil features affecting—	
	Topsoil	Sand and gravel	Road fill	Highway and road location	Ponds: Reservoir areas
Upshur: UaB, UaC	Fair to poor	Unsuitable	Poor: landslide prone.	Highly plastic subsoil; landslide prone on cut and fill slopes; erodible; moderate potential frost action; seep spots and springs.	Low seepage losses; landslide prone.
*Urban land. Properties are too variable for interpretations to be made. For the Culleoka part of UCB, UCD, and UCE, see the Culleoka series. For the Guernsey part of UGB and UGD, see the Guernsey series. For the Rainsboro part of URB and URC, see the Rainsboro series. For the Wharton part of UWB and UWD, see the Wharton series.					
Vandergrift Mapped only in complexes with Ernest, Gilpin, and Guernsey soils.	Fair to poor	Unsuitable	Poor: landslide prone.	Seasonal high water table; highly plastic subsoil; landslide prone on cut and fill slopes; erodible; high potential frost action; seep spots and springs.	Low seepage losses; landslide prone.
Weikert: WEF Rock outcrop part of WEF not rated.	Poor	Unsuitable	Fair	Bedrock at a depth of 1 to 1½ feet; erodible; moderate potential frost action.	Pervious bedrock at a depth of 1 to 1½ feet.
Wharton: WhB, WhC, WhD	Fair	Unsuitable	Poor	Seasonal high water table; highly plastic subsoil; erodible; high potential frost action.	Low seepage losses.

Slope, depth to hard rock, content of stones and rocks, and wetness affect ease of excavation and amount of cut and fill material needed to reach an even grade.

Pond reservoir areas hold water behind a dam or embankment. Soils suitable for pond reservoir areas have low seepage, which is related to their permeability and depth to fractured or permeable bedrock or other permeable material.

Pond embankments require soil material that is resistant to seepage and piping and that is of favorable stability, shrink-swell potential, shear strength, and compactibility. Stones or organic material in a soil are among factors that are unfavorable.

Drainage of soils for crops and pasture is affected by permeability, texture, and structure; depth to claypan, rock, or other layers that influence rate of water movement; depth to the water table; slope; stability in ditchbanks; susceptibility to stream overflow; and availability of outlets for drainage.

Terraces or diversions are embankments, or ridges, constructed across the slope to intercept runoff so that it soaks into the soil or flows slowly to a prepared outlet. Features that affect suitability of a soil for terraces are uniformity and steepness of slope; depth to bedrock or other unfavorable material; content of stones; permeability; and resistance to water erosion. A soil suitable for these structures has outlets for runoff and is not difficult to vegetate.

Grassed waterways are affected by texture, depth, and erodibility of the soil material, stones or rock out-

for engineering uses—Continued

	Soil features affecting—Continued				
Ponds—Continued Embankments	Drainage for crops and pasture	Terraces or diversions	Grassed waterways	Winter grading	Pipeline construction and maintenance
Highly plastic; landslide prone; low shear strength; medium to high compressibility; low permeability.	Seep spots and springs; well drained.	Slow permeability in subsoil; landslide prone; seep spots and springs.	Slow permeability in subsoil; landslide prone; seep spots and springs.	Clayey subsoil; landslide prone.	Landslide prone; clayey subsoil.
Highly plastic; landslide prone; low shear strength; medium to high compressibility; low permeability.	Slow permeability; seasonal high water table; seep spots and springs.	Seasonal high water table; slow permeability in subsoil; landslide prone; seep spots and springs.	Seasonal high water table; slow permeability in subsoil; landslide prone; seep spots and springs.	Seasonal high water table; clayey subsoil; landslide prone.	Seasonal high water table; landslide prone; clayey subsoil.
Bedrock at a depth of 1 to 1½ feet.	Well drained	Bedrock at a depth of 1 to 1½ feet.	Bedrock at a depth of 1 to 1½ feet.	No unfavorable features.	Bedrock at a depth of 1 to 1½ feet.
Highly plastic; medium to low shear strength; medium to high compressibility; low to medium permeability.	Seasonal high water table; slow permeability.	Seasonal high water table; slow permeability in substratum.	Seasonal high water table; slow permeability in substratum.	Seasonal high water table; clayey subsoil.	Seasonal high water table; clayey subsoil.

crops, and the steepness of slopes. Other factors affecting waterways are seepage, natural soil drainage, available water capacity, susceptibility to siltation, and the ease of establishing and maintaining vegetation.

Winter grading is affected chiefly by soil features that are relevant to moving, mixing, and compacting soil in road building when temperatures are below freezing.

Shallow excavations, such as those required for pipeline construction and maintenance or for sewer lines or open ditches, are generally dug, or trenched, to a depth of less than 6 feet. Desirable soils have good workability, moderate resistance to caving, gentle slopes, and absence of rock outcrops or big stones, are not subject to flooding, and do not have a high water table.

Engineering test data

Table 4 contains engineering test data for some of the major soil series in Allegheny County. The tests were made to help evaluate the soils for engineering purposes. The engineering classifications are based on data obtained by mechanical analyses and by tests to determine liquid limit and plastic limit. The mechanical analyses were made by combined sieve and hydrometer methods.

Maximum dry density and optimum moisture content are determined as explained for table 2.

Liquid limit and plasticity index indicate the effect of water on the strength and consistence of soil material. As the moisture content of a clayey soil is increased from a dry state, the material changes from

TABLE 4.—*Engineering*

[Tests performed by the Pennsylvania Department of Transportation Soil Testing Laboratory, Harrisburg, according

Soil name and location	Parent material	Engineering report number	Depth from surface	Moisture-density data [1]		Mechanical analysis [2]	
				Maximum dry density	Optimum moisture	Percentage passing sieve—	
						3 inches	¾ inch
			Inches	*Pounds per Cubic foot*	*Percent*		
Atkins silt loam:							
Marshall Township, 750 feet south of Youth Development Center access road, 1/10 mile west of its intersection with U.S. Highway 19 and 150 feet east of electric pole 121.	Recent alluvium.	BP–34465 BP–34466	12–20 34–44	110 116	16 13		
Clymer silt loam:							
Marshall Township, along the west side of Pennsylvania Route 856, ¼ mile south of its intersection with Route 02271.	Sandstone.	BP–32656 BP–32657	28–37 37–55	122 122	11 11	100 100	89 69
Culleoka silt loam:							
Bethel Park Borough, 1/5 mile south of intersection of Route 02240 and Route 02327, and 320 feet southwest of electric pole 898.	Shale and fine grained sandstone.	BP–23306 BP–23307	10–21 21–27	115 117	13 14	100 100	96 87
Dormont silt loam:							
Upper St. Clair Township, 3/4 mile southeast of intersection of U.S. Highway 19 and Hays Road.	Shale, clay shale, and limestone.	BP–37511 BP–37512	10–20 29–40	110 114	15 15		100 100
Gilpin silt loam:							
Marshall Township, along the north side of T-725, 1/3 mile west of intersection of Brush Creek Road.	Shale and fine grained sandstone.	BP–23280 BP–23281	5–14 23–31	117 120	13 13	100 100	95 65
Guernsey silt loam:							
Upper St. Clair Township, on the south side of dirt road about 3/4 mile west-southwest of the intersection of U.S. Highway 19 and State Route 02046.	Clay shale and limestone.	BP–23288 BP–23289	11–20 27–34	108 103	16 19		100
Hazleton loam:							
Marshall Township, 600 feet north of Route 02045, 2/10 mile west of its intersection with Route 02133.	Sandstone.	BP–32662 BP–32663	9–17 28–60	121 121	10 10	100	87 88
Library silty clay loam:							
North Fayette Township, 600 feet northeast of Route 02033, 3/10 mile north of its intersection with Route T362 and 120 feet southeast of telephone pole 5/35.	Clay shale and limestone.	BP–23286 BP–23287	13–19 25–41	104 117	19 14		100 100
Rayne silt loam:							
Franklin Park Borough, 2/10 mile south of intersection of Route A-3755 and Warrendale-Bayne Road.	Shale and fine grained sandstone.	BP–32652 BP–32653	14–26 38–46	113 113	15 15	100	90
Weikert shaly silt loam:							
Marshall Township, 3/8 mile northeast of the Pennsylvania Turnpike overpass at U.S. Highway 19.	Shale and fine grained sandstone.	BP–23278	6–13	121	12	100	68
Wharton silt loam:							
Hampton Township, along the south side of Route 02280, 0.35 mile west of Route 02126.	Clay shale.	BP–32646 BP–32647	21–34 42–60	104 110	20 17		

[1] Based on AASHTO Designation T 99–57, Method A. (*2*).

[2] Mechanical analyses according to AASHTO Designation T 88–57 (*2*). Results by this procedure may differ somewhat from the results obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHTO procedure, the fine material is analyzed by hydrometer method, and the various grain-size fractions are calculated on the basis of all material including that 3 inches in diameter. In the SCS procedure, the fine material is analyzed by the pipette method, and the material coarser than 2 millimeters in diameter is excluded from the calculations of grain-size fractions. The mechanical analyses used in this table are not suitable for use in naming textural classes of soil.

test data

to standard procedures of the American Association of State Highway and Transportation Officials (AASHTO) (*2*)]

Mechanical analysis [3]—Continued								Liquid limit [3]	Plasticity index [4]	Classification	
Percentage passing sieve—continued				Percentage smaller than—							
No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)	0.05 mm	0.02 mm	0.005 mm	0.002 mm			AASHTO [5]	Unified [6]
								Percent			
----------	100	97	74	71	54	28	18	30	6	A–4(8)	ML
----------	100	99	61	57	44	22	15	26	5	A–4(8)	CL–ML
85	83	68	33	32	27	16	10	22	2	A–2–4(0)	SM
44	40	36	10	9	7	5	4	17	[7] NP	A–1–b(0)	GP–GM
87	80	74	62	57	40	27	22	33	8	A–4(5)	ML
71	62	58	43	38	27	16	14	32	5	A–4(5)	SM
96	93	90	85	84	69	40	31	37	11	A–6(8)	ML
93	87	83	74	71	56	37	30	40	14	A–6(9)	ML
86	82	78	58	56	46	25	18	26	6	A–4(5)	CL–ML
48	43	41	21	19	15	10	8	24	1	A–1–b(0)	GM
98	97	94	92	91	82	58	47	47	20	A–7–6(13)	CL
----------	100	99	99	99	95	71	61	62	33	A–7–6(20)	CH
77	75	64	21	20	16	9	6	19	NP	A–2–4(0)	SM
74	71	63	16	15	11	7	5	NP	NP	A–2–4(0)	SM
98	97	96	93	93	84	65	52	61	29	A–7–5(20)	MH
90	83	79	76	75	64	39	27	43	16	A–7–6(11)	ML
100	98	95	91	90	69	38	30	35	12	A–6(9)	CL
68	58	52	45	42	31	17	13	35	9	A–4(2)	GM
34	26	20	18	18	13	8	5	30	5	A–1–b(0)	GM
----------	100	98	95	82	53	44	35	44	18	A–7–6(12)	CL
----------	100	98	96	95	89	78	65	52	23	A–7–6(16)	MH

[3] Based on AASHTO Designation T 89–60 (*2*).
[4] Based on AASHTO Designations T 90–56 and T 91–54 (*2*).
[5] Based on AASHTO Designation M 145–661 (*2*).
[6] Based on ASTM Designation D 2487–66 T (*3*).
[7] NP means nonplastic.

semisolid to plastic. If the moisture content is further increased, the material changes from a plastic to liquid. The plastic limit is the moisture content at which the soil material changes from semisolid to plastic, and the liquid limit, from plastic to liquid. The plasticity index is the numerical difference between the liquid limit and the plastic limit. It indicates the range of moisture content within which a soil material is plastic. Liquid limit and plasticity index in table 4 are based on tests for soil samples. The data in table 4 is for modal profiles.

Use of the Soils for Town and Country Planning

This section of the soil survey provides information on the properties of soils and their effect on selected uses of soils in town and country development. It can help community planners, developers, and individual landowners determine the most suitable use for a particular area. Other useful information can be found on the soil map and in other parts of the survey, particularly the section "Description of the Soils" and the section "Engineering Uses of the Soils." Although the soil map and tables serve as a guide and can eliminate some sites from further consideration, they do not supplant direct detailed onsite investigations when a development is being planned. Not considered in rating the soils are location in relation to established business centers or transportation lines and other economic factors that are important in determining the ultimate use of an area.

Soil limitations in table 5 are indicated by the ratings *slight, moderate,* and *severe. Slight* means that soil properties generally are favorable for the rated use or, in other words, that limitations are minor and easily overcome. *Moderate* means that some soil properties are favorable but can be overcome or modified by special planning and design. *Severe* means that soil properties are so unfavorable and so difficult to correct or overcome that major soil reclamation, special designs, or intensive maintenance are required.

Following are explanations of the columns in table 5:

In septic tank absorption fields, subsurface tile or perforated pipe distributes effluent from a septic tank into natural soil. The soil material from a depth of 18 inches to 5 feet is evaluated, and the soil properties considered are those that affect absorption of effluent and construction and operation of the system. Properties that affect absorption are permeability, depth to water table or rock, and susceptibility to flooding. Slope affects the layout and construction and determines the risk of soil erosion, lateral seepage, and downslope flow of effluent. Large rocks or boulders increase construction costs.

Sewage lagoons are shallow ponds constructed to hold sewage, within a depth of 2 to 5 feet, long enough for bacteria to decompose the solids. A lagoon has a nearly level floor; its sides, or embankments, are of compacted soil material. The assumption is made that the embankment is compacted to medium density and that the pond is protected from flooding. Properties that affect the pond floor are permeability, organic the kind of bedrock and the depth to it are important. matter, and slope, and if the floor needs to be leveled, The soil properties that affect the embankment are the engineering properties of the embankment material as interpreted from the Unified Soil Classification and the amount of stones, if any, that influence the ease of excavation and compaction of the embankment material.

Dwelling with basements as rated in table 5 are for dwellings or other buildings three stories high or less that have no more than an 8-foot excavation for basements. Buildings that have a foundation load in excess of this and that have more than an 8-foot excavation for basements are excluded from the ratings. Considered in rating the soils are the depth to water table, shrink-swell potential, the depth to and the kind of bedrock, soil texture, the percent of slope, potential frost action, hazard of flooding, and susceptibility to landslide (fig. 15).

***Figure 15.*—A house destroyed by a landslide on Guernsey silt loam.**

For lawns and landscaping, it is assumed that enough lime and fertilizer are used for lawn grasses and ornamental plants to grow. Suitable soil material is needed in sufficient quantities so that desirable trees and other plants can survive and grow well. Important soil properties are depth to bedrock or to layers that restrict water and roots, texture, slope, depth to water table, and the content of stones or rocks.

Roads and streets, as rated in table 5, have an all-weather surface expected to carry automobile traffic all year. They have a subgrade of underlying soil material, a base consisting of gravel, crushed rock, or soil material stabilized with lime or cement, and a flexible or rigid surface, commonly asphalt or concrete. These

roads are graded to shed water and have ordinary provisions for drainage. They are built mainly from soil at hand, and most cuts and fills are less than 6 feet deep.

Soil properties that most affect design and construction of roads and streets are load supporting capacity, stability of the subgrade, and the workability and quantity of cut and fill material available. The AASHTO and Unified classifications of the soil material and the shrink-swell potential indicate traffic supporting capacity. Wetness and flooding affect stability of the material. Slope, depth to hard rock, content of stones and rocks, and wetness affect ease of excavation and amount of cut and fill needed to reach an even grade.

Sanitary landfills (trench type) are used for disposing of refuse. The waste is spread in thin layers, compacted, and covered with soil throughout the disposal period. Landfill areas are subject to heavy vehicular traffic. Soil properties that affect suitability for landfill are ease of excavation, hazard of polluting ground water, and trafficability. The best soils for this use have moderately slow permeability, withstand heavy traffic, and are friable and easy to excavate. Unless otherwise stated the ratings in table 5 apply only to the soil material to a depth of about 5 feet, and therefore limitation ratings of *slight* or *moderate* may not be valid if trenches are to be much deeper than that. For some soils, reliable predictions can be made to a depth of 10 or 15 feet; nevertheless every site should be investigated before it is selected.

Use of the Soils for Recreation Facilities

Knowledge of soils is necessary in planning, developing, and maintaining areas used for recreation. The limitations of the soils that affect their suitability for camp areas, service buildings and dwellings without basements, paths and trails, picnic areas, playgrounds, and golf fairways are given in table 6. The degree of the limitation is expressed as *slight, moderate,* or *severe.* It is assumed that a good cover of vegetation can be established and maintained. A limitation of *slight* means that soil properties are generally favorable and limitations are so minor that they can easily be overcome. A *moderate* limitation can be overcome or modified by planning, by design, or by special maintenance. A *severe* limitation means that costly soil reclamation, special design, or intense maintenance, or a combination of these, is required.

Camp areas are used intensively for tents and small camp trailers and the accompanying activities of outdoor living. Little preparation of the site is required, other than shaping and leveling for tent and parking areas. Camp areas are subject to heavy foot traffic and limited vehicular traffic. The best soils have mild slopes, good drainage, and a surface free of rocks and coarse fragments and are not subject to flooding during periods of heavy use; their surface is firm after rain but not dusty when dry.

Service buildings and dwellings without basements, as rated in table 6, are not more than three stories high. They are supported by foundation footings placed in undisturbed soil. The features that affect the rating of a soil for service buildings are capacity to support load and resist settlement under load and ease of excavation. Soil properties that affect capacity to support load are wetness, susceptibility to flooding, density, plasticity, texture, and shrink-swell potential. Those that affect excavation are wetness, slope, depth to bedrock, content of stones, and outcroppings of bedrock.

Paths and trails are used for local and cross-country travel by foot or horseback (fig. 16). Design and layout should require little or no cutting and filling. The best soils are at least moderately well drained, are firm when wet but not dusty when dry, are flooded not more than once during the season of use, have slopes of less than 15 percent, and have few or no rocks or stones on the surface.

Picnic areas are attractive natural or landscaped tracts that carry heavy foot traffic. Most of the vehicular traffic is confined to access roads. The best soils are firm when wet but not dusty when dry, are not subject to flooding during the season of use, and do not have slopes or stones that can greatly increase the cost of leveling sites or of building access roads.

Playgrounds are areas used intensively for baseball, football, badminton, and other organized games (fig. 17). Soils suitable for this use need to withstand intensive foot traffic. The best soils have a nearly level surface free of coarse fragments and rock outcrops. They have good drainage and are not subject to flooding during periods of heavy use. Their surface is firm after rain but not dusty when dry. If grading and leveling are required, depth to rock is important.

Golf fairways are used intensively and are subject to heavy foot traffic. Most of the vehicular traffic is confined to hard surface trails and roads. The best soils have good drainage, mild slopes, and a surface free of rocks and stones. The surface is firm after rain but not dusty when dry.

Wildlife [4]

The kind and numbers of wildlife depend on the type of habitat available. Wildlife thrives where the vegetation meets habitat requirements. Vegetation, in turn, depends mostly on the kinds of soil. When natural conditions are altered by urban development or by management practices on farmland or woodland, the kind and pattern of vegetation changes, followed by changes in the kinds and numbers of wildlife.

The soils in Allegheny County are suitable for use as woodlands, parks, and refuges. Thus, they provide suitable habitat for wildlife. Habitat for songbirds can be developed in residential areas. The streams, lakes, and reservoirs in the county have potential for greater use as wildlife habitat.

Kinds of wildlife

Allegheny County has a wide variety of birds and mammals. Wildlife population has been greatly affected by patterns of land use, especially increasing urban development. Urbanization has altered not only wildlife habitat but also the life span of some species. Some animals have been driven to outlying areas.

[4] By CLAYTON L. HEINEY, JR., wildlife biologist, Soil Conservation Service.

TABLE 5.—*Soil limitations for*

Soil series and map symbols	Septic tank absorption fields [1]	Sewage lagoons [1]
Allegheny variant:		
AgB	Slight: hazard of ground water contamination.	Severe: moderately rapid permeability in substratum.
AgC	Moderate: slope; hazard of ground water contamination.	Severe: moderately rapid permeability in substratum; slope.
Atkins: At	Severe: hazard of flooding; high water table; hazard of ground water contamination.	Severe: hazard of flooding; moderately rapid permeability in substratum.
Brinkerton: BrB	Severe: high water table; slow permeability.	Moderate: slope; hazard of inflow.
Cavode:		
CaB	Severe: slow permeability; seasonal high water table.	Moderate: slope; bedrock at a depth of 3½ or more feet; hazard of inflow.
CaC	Severe: slow permeability; seasonal high water table.	Severe: slope
Clarksburg:		
CkB	Severe: seasonal high water table; slow permeability.	Moderate: slope; hazard of inflow.
CkC	Severe: seasonal high water table; slow permeability.	Severe: slope
Clymer:		
CmB	Moderate: bedrock at a depth of 3½ to 6 feet; hazard of ground water contamination.	Severe: moderately rapid permeability.
CmC	Moderate: bedrock at a depth of 3½ to 6 feet; hazard of ground water contamination; slope.	Severe: moderately rapid permeability; slope.
CmD	Severe: slope; hazard of ground water contamination.	Severe: moderately rapid permeability; slope.
Culleoka:		
CuB, CwB For the Weikert part of CwB, see the Weikert series.	Severe: bedrock at a depth of 1½ to 3½ feet.	Severe: bedrock at a depth of 1½ to 3½ feet.
CuC, CwC For the Weikert part of CwC, see the Weikert series.	Severe: bedrock at a depth of 1½ to 3½ feet.	Severe: bedrock at a depth of 1½ to 3½ feet; slope.
CuD, CwD For the Weikert part of CwD, see the Weikert series.	Severe: bedrock at a depth of 1½ to 3½ feet; slope.	Severe: bedrock at a depth of 1½ to 3½ feet; slope.
Culleoka part of GSF	Severe: bedrock at a depth of 1½ to 3½ feet; slope.	Severe: bedrock at a depth of 1½ to 3½ feet; slope.
Culleoka part of UCE	Severe: bedrock at a depth of 1½ to 3½ feet; slope.	Severe: bedrock at a depth of 1½ to 3½ feet; slope.
Dormont:		
DoB	Severe: seasonal high water table; slow permeability.	Moderate: slope
DoC	Severe: seasonal high water table; slow permeability.	Severe: slope
DoD	Severe: seasonal high water table; slow permeability; slope.	Severe: slope
DoE	Severe: seasonal high water table; slow permeability; slope.	Severe: slope
Dumps: Du, Dw. Properties are too variable to be rated.		
Ernest:		
ErB	Severe: seasonal high water table; slow permeability.	Moderate: slope
ErC	Severe: seasonal high water table; slow permeability.	Severe: slope

town and country planning

Dwellings with basements	Lawns and landscaping	Roads and streets	Sanitary landfills (trench)[1]
Slight	Slight	Slight	Severe: moderately rapid permeability in substratum.
Moderate: slope	Moderate: slope	Moderate: slope	Severe: moderately rapid permeability in substratum.
Severe: hazard of flooding; high water table.	Severe: hazard of floooding; high water table.	Severe: hazard of flooding; high water table; potential frost action.	Severe: hazard of flooding; high water table; moderately rapid permeability in substratum.
Severe: high water table	Severe: high water table	Severe: high water table; potential frost action.	Severe: high water table.
Severe: seasonal high water table.	Moderate: seasonal high water table.	Moderate: potential frost action; seasonal high water table.	Severe: clayey; seasonal high water table.
Severe: seasonal high water table.	Moderate: seasonal high water table; slope.	Moderate: potential frost action; seasonal high water table; slope.	Severe: clayey; seasonal high water table.
Moderate: seasonal high water table.	Slight	Slight	Severe: seasonal high water table.
Moderate: seasonal high water table; slope.	Moderate: slope	Moderate: slope	Severe: seasonal high water table.
Slight [2]	Slight	Slight [2]	Severe: moderately rapid permeability.
Moderate [2]: slope	Moderate	Moderate [2]: slope	Severe: moderately rapid permeability.
Severe [2]: slope	Severe: slope	Severe [2]: slope	Severe: moderately rapid permeability.
Moderate [2]: bedrock at a depth of 1½ to 3½ feet.	Moderate: bedrock at a depth of 1½ to 3½ feet.	Slight [2]	Moderate: bedrock at a depth of 1½ to 3½ feet.
Moderate [2]: bedrock at a depth of 1½ to 3½ feet; slope.	Moderate: bedrock at a depth of 1½ to 3½ feet; slope.	Moderate [2]: bedrock at a depth of 1½ to 3½ feet; slope.	Moderate: bedrock at a depth of 1½ to 3½ feet.
Severe [2]: slope	Severe: slope	Severe [2]: slope	Moderate: bedrock at a depth of 1½ to 3½ feet; slope.
Severe [2]: slope	Severe: slope	Severe [2]: slope	Severe: slope.
Severe [2]: slope	Severe: slope	Severe [2]: slope	Severe: slope.
Moderate: seasonal high water table.	Slight	Slight	Severe: seasonal high water table.
Moderate: seasonal high water table; slope.	Moderate: slope	Moderate: slope	Severe: seasonal high water table.
Severe: slope	Severe: slope	Severe: slope	Severe: seasonal high water table.
Severe: slope	Severe: slope	Severe: slope	Severe: seasonal high water table; slope.
Moderate: seasonal high water table.	Slight	Slight	Severe: seasonal high water table.
Moderate: seasonal high water table; slope.	Moderate: slope	Moderate: slope	Severe: seasonal high water table.

TABLE 5.—*Soil limitations for*

Soil series and map symbols	Septic tank absorption fields [1]	Sewage lagoons [1]
ErD	Severe: seasonal high water table; slow permeability; slope.	Severe: slope
EvB Rating is for both Ernest and Vandergrift parts.	Severe: seasonal high water table; slow permeability.	Moderate: slope
EvC Rating is for both Ernest and Vandergrift parts.	Severe: seasonal high water table; slow permeability.	Severe: slope
EvD Rating is for both Ernest and Vandergrift parts.	Severe: seasonal high water table; slow permeability; slope.	Severe: slope
Gilpin:		
GlB, GpB For the Upshur part of GpB, see UaB in the Upshur series.	Severe: bedrock at a depth of 1½ to 3 feet.	Severe: bedrock at a depth of 1½ to 3 feet.
GlC, GpC For the Upshur part of GpC, see UaC in the Upshur series.	Severe: bedrock at a depth of 1½ to 3½ feet.	Severe: bedrock at a depth of 1½ to 3½ feet; slope.
GlD, GpD For the Upshur part of GpD, see the Upshur series.	Severe: bedrock at a depth of 1½ to 3½ feet; slope.	Severe: bedrock at a depth of 1½ to 3½ feet; slope.
GQF For the Upshur part of GQF, see the Upshur series.	Severe: bedrock at a depth of 1½ to 3 feet; slope.	Severe: bedrock at a depth of 1½ to 3 feet; slope.
GrE For the Vandergrift part of GrE, see the Vandergrift series.	Severe: bedrock at a depth of 1½ to 3½ feet; slope.	Severe: bedrock at a depth of 1½ to 3½ feet; slope.
GSF For the Culleoka part of GSF, see the Culleoka series. For the Weikert part of GSF, see the Weikert series.	Severe: bedrock at a depth of 1½ to 3½ feet; slope.	Severe: bedrock at a depth of 1½ to 3½ feet; slope.
Guernsey:		
GuB	Severe: seasonal high water table; slow permeability.	Moderate: slope
GuC	Severe: seasonal high water table; slow permeability.	Severe: slope
GuD	Severe: seasonal high water table; slow permeability; slope.	Severe: slope
GvB Rating is for both Guernsey and Vandergrift parts.	Severe: seasonal high water table; slow permeability.	Moderate: slope
GvC Rating is for both Guernsey and Vandergrift parts.	Severe: seasonal high water table; slow permeability.	Severe: slope
GvD Rating is for both Guernsey and Vandergrift parts.	Severe: seasonal high water table; slow permeability; slope.	Severe: slope
Gullied land: Gx Properties are too variable to be rated.		
Hazleton:		
HaB	Moderate: bedrock at a depth of 3½ to 6 feet; hazard of ground water contamination.	Severe: moderately rapid permeability.
HaC	Moderate: bedrock at a depth of 3½ to 6 feet; hazard of ground water contamination; slope.	Severe: moderately rapid permeability; slope.
HaD	Severe: slope; hazard of ground water contamination.	Severe: moderately rapid permeability; slope.
HTE	Severe: slope; hazard of ground water contamination.	Severe: moderately rapid permeability; slope.
Huntington: Hu	Severe: hazard of flooding	Severe: hazard of flooding; moderately rapid permeability in substratum.
Library:		
LbB	Severe: seasonal high water table; slow permeability.	Moderate: slope; hazard of inflow.

town and country planning—Continued

Dwellings with basements	Lawns and landscaping	Roads and streets	Sanitary landfills (trench)[1]
Severe: slope	Severe: slope	Severe: slope	Severe: seasonal high water table.
Moderate: seasonal high water table.	Slight	Slight	Severe: seasonal high water table.
Moderate: seasonal high water table; slope.	Moderate: slope	Moderate: slope	Severe: seasonal high water table.
Severe: slope	Severe: slope	Severe: slope	Severe: seasonal high water table.
Moderate[2]: bedrock at a depth of 1½ to 3 feet.	Moderate: bedrock at a depth of 1½ to 3 feet.	Slight[2]	Moderate: bedrock at a depth of 1½ to 3 feet.
Moderate[2]: bedrock at a depth of 1½ to 3½ feet; slope.	Moderate: bedrock at a depth of 1½ to 3½ feet; slope.	Moderate[2]: bedrock at a depth of 1½ to 3½ feet.	Moderate: bedrock at a depth of 1½ to 3½ feet.
Severe[2]: slope	Severe: slope	Severe: slope	Moderate: bedrock at a depth of 1½ to 3½ feet; slope.
Severe[2]: slope	Severe: slope	Severe[2]: slope	Severe: slope.
Severe[2]: slope	Severe: slope	Severe[2]: slope	Severe: slope.
Severe[2]: slope	Severe: slope	Severe[2]: slope	Severe: slope.
Moderate: seasonal high water table.	Slight	Slight	Severe: seasonal high water table; too clayey.
Moderate: seasonal high water table; slope.	Moderate: slope	Moderate: slope	Severe: seasonal high water table; too clayey.
Severe: slope	Severe: slope	Severe: slope	Severe: seasonal high water table; too clayey.
Moderate: seasonal high water table.	Slight	Slight	Severe: seasonal high water table; too clayey.
Moderate: seasonal high water table; slope.	Moderate: slope	Moderate: slope	Severe: seasonal high water table; too clayey.
Severe: slope	Severe: slope	Severe: slope	Severe: seasonal high water table; too clayey.
Slight[3]	Slight	Slight	Severe: moderately rapid permeability.
Moderate[3]: slope	Moderate: slope	Moderate: slope	Severe: moderately rapid permeability.
Severe[3]: slope	Severe: slope	Severe: slope	Severe: moderately rapid permeability.
Severe[3]: slope	Severe: slope	Severe: slope	Severe: moderately rapid permeability; slope.
Severe: hazard of flooding	Moderate: hazard of flooding	Severe: hazard of flooding	Severe: hazard of flooding; moderately rapid permeability in substratum.
Severe: seasonal high water table.	Moderate: seasonal high water table; too clayey.	Moderate: frost action; seasonal high water table.	Severe: seasonal high water table; too clayey.

TABLE 5.—*Soil limitations for*

Soil series and map symbols	Septic tank absorption fields [1]	Sewage lagoons [1]
LbC	Severe: seasonal high water table; slow permeability.	Severe: slope
LbD	Severe: seasonal high water table; slow permeability.	Severe: slope
Lindside: Ln	Severe: hazard of flooding; seasonal high water table.	Severe: hazard of flooding; moderately rapid permeability in substratum.
Newark: Ne	Severe: hazard of flooding; high water table.	Severe: hazard of flooding
Philo: Ph	Severe: hazard of flooding	Severe: hazard of flooding; moderately rapid permeability in substratum.
Rainsboro:		
RaA	Severe: seasonal high water table; slow permeability.	Slight
RaB	Severe: seasonal high water table; slow permeability.	Moderate: slope
RaC	Severe: seasonal high water table; slow permeability.	Severe: slope
Rayne:		
RyB	Moderate: bedrock at a depth of 3½ to 5 feet.	Severe: moderately rapid permeability in substratum.
RyC	Moderate: bedrock at a depth of 3½ to 5 feet; slope.	Severe: moderately rapid permeability in substratum; slope.
Strip mines: SmB, SmD, SmF. Properties are too variable to be rated.		
Upshur:		
UaB	Severe: slow permeability	Moderate: slope; bedrock at a depth of 4 to 6 feet.
UaC	Severe: slow permeability	Severe: slope
Upshur part of GpD	Severe: slow permeability; slope.	Severe: slope
Upshur part of GQF	Severe: slow permeability; slope.	Severe: slope
Urban land: UB, UCB, UCD, UCE, UGB, UGD, URB, URC, UWB, UWD. Properties of Urban land are too variable to be rated. For the Culleoka part of UCB and UCD, see CuB and CuD in the Culleoka series. For the Culleoka part of UCE, see the Culleoka series. For the Guernsey part of UGB and UGD, see GuB and GuD in the Guernsey series. For the Rainsboro part of URB and URC, see RaB and RaC in the Rainsboro series. For the Wharton part of UWB and UWD, see WhB and WhD in the Wharton series.		
Vandergrift:		
Vandergrift part of GrE	Severe: slow permeability; seasonal high water table; prone to landslides.	Severe: slope; prone to landslides.
Weikert:		
WEF. Properties of the Rock outcrop part are too variable to be rated.	Severe: bedrock at a depth of 1 to 1½ feet; slope.	Severe: bedrock at a depth of 1 to 1½ feet; slope.

town and country planning—Continued

Dwellings with basements	Lawns and landscaping	Roads and streets	Sanitary landfills (trench)[1]
Severe: seasonal high water table.	Moderate: seasonal high water table; too clayey; slope.	Moderate: frost action; seasonal high water table; slope.	Severe: seasonal high water table; too clayey.
Severe: seasonal high water table; slope.	Severe: slope	Severe: slope	Severe: seasonal high water table; too clayey.
Severe: hazard of flooding	Moderate: hazard of flooding.	Severe: hazard of flooding	Severe: hazard of flooding; seasonal high water table; moderately rapid permeability in substratum.
Severe: hazard of flooding; high water table.	Severe: hazard of flooding; high water table.	Severe: hazard of flooding; high water table.	Severe: hazard of flooding; high water table.
Severe: hazard of flooding	Moderate: hazard of flooding.	Severe: hazard of flooding	Severe: hazard of flooding; seasonal high water table; moderately rapid permeability in substratum.
Moderate: seasonal high water table.	Slight	Moderate: frost action	Severe: seasonal high water table.
Moderate: seasonal high water table.	Slight	Moderate: frost action	Severe: seasonal high water table.
Moderate: seasonal high water table; slope.	Moderate: slope	Moderate: frost action; slope.	Severe: seasonal high water table.
Slight[2]	Slight	Slight	Severe: moderately rapid permeability in substratum.
Moderate[2]: slope	Moderate: slope	Moderate: slope	Severe: moderately rapid permeability in substratum; slope.
Moderate: high shrink-swell.	Moderate: too clayey	Slight	Severe: too clayey.
Moderate: high shrink-swell; slope; prone to landslide.	Moderate: too clayey; slope	Moderate: slope	Severe: too clayey.
Severe: slope; prone to landslide.	Severe: slope	Severe: slope; prone to landslide.	Severe: too clayey; prone to landslide.
Very severe: slope; prone to landslide.	Severe: slope	Very severe: slope; prone to landslide.	Severe: too clayey; slope; prone to landslide.
Severe: slope; prone to landslides.	Severe: slope; prone to landslides.	Severe: slope; prone to landslides.	Severe: slope; prone to landslides.
Severe: slope	Severe: bedrock at a depth of 1 to 1½ feet; slope.	Severe: slope	Very severe: bedrock at a depth of 1 to 1½ feet; slope.

TABLE 5.—*Soil limitations for*

Soil series and map symbols	Septic tank absorption fields [1]	Sewage lagoons [1]
Weikert part of CwB	Severe: bedrock at a depth of 1 to 1½ feet.	Severe: bedrock at a depth of 1 to 1½ feet; moderately rapid permeability.
Weikert part of CwC	Severe: bedrock at a depth of 1 to 1½ feet.	Severe: bedrock at a depth of 1 to 1½ feet; moderately rapid permeability.
Weikert part of CwD	Severe: bedrock at a depth of 1 to 1½ feet; slope.	Severe: bedrock at a depth of 1 to 1½ feet; moderately rapid permeability.
Weikert part of GSF	Severe: bedrock at a depth of 1 to 1½ feet; slope.	Severe: bedrock at a depth of 1 to 1½ feet; slope.
Wharton:		
WhB	Severe: seasonal high water table; slow permeability.	Moderate: slope; bedrock at a depth of 4 feet or more.
WhC	Severe: seasonal high water table; slow permeability.	Severe: slope
WhD	Severe: seasonal high water table; slow permeability; slope.	Severe: slope

[1] Onsite studies of the underlying strata, water tables, and hazards of aquifer pollution and drainage into ground water also need to be made.

Figure 16.—A bridle trail on Gilpin-Vandergrift silt loams, slumped.

town and country planning—Continued

Dwellings with basements	Lawns and landscaping	Roads and streets	Sanitary landfills (trench)[1]
Severe[2]: bedrock at a depth of 1 to 1½ feet.	Severe: bedrock at a depth of 1 to 1½ feet.	Severe[2]: bedrock at a depth of 1 to 1½ feet.	Severe: moderately rapid permeability.
Moderate[2]: bedrock at a depth of 1 to 1½ feet; slope.	Severe: bedrock at a depth of 1 to 1½ feet.	Moderate[2]: bedrock at a depth of 1 to 1½ feet; slope.	Severe: moderately rapid permeability.
Severe[2]: slope	Severe: bedrock at a depth of 1 to 1½ feet; slope.	Severe[2]: slope	Severe: moderately rapid permeability.
Severe[2]: slope	Severe: bedrock at a depth of 1 to 1½ feet; slope.	Severe[2]: slope	Severe: bedrock at a depth of 1 to 1½ feet; moderately rapid permeability.
Moderate: seasonal high water table.	Slight	Slight	Severe: seasonal high water table.
Moderate: seasonal high water table; slope.	Moderate: slope	Moderate: slope	Severe: seasonal high water table.
Severe: slope	Severe: slope	Severe: slope	Severe: seasonal high water table.

[2] Bedrock is normally rippable to a depth of 5 feet or more with light power equipment such as backhoes.

***Figure 17.*—A playground on Atkins silt loam.**

TABLE 6.—*Soil limitations for*

Soil series and map symbols	Camp areas	Service buildings and dwellings without basements
Allegheny variant:		
AgB	Slight	Slight
AgC	Moderate: slope	Moderate: slope
Atkins: At	Severe: high water table	Severe: high water table; hazard of flooding.
Brinkerton: BrB	Severe: high water table	Severe: high water table
Cavode:		
CaB	Moderate: seasonal high water table; slow permeability.	Moderate: seasonal high water table.
CaC	Moderate: seasonal high water table; slow permeability; slope.	Moderate: seasonal high water table; slope.
Clarksburg:		
CkB	Moderate: slow permeability	Slight
CkC	Moderate: slow permeability; slope.	Moderate: slope
Clymer:		
CmB	Slight	Slight [1]
CmC	Moderate: slope	Moderate: [1] slope
CmD	Severe: slope	Severe: [1] slope
Culleoka:		
CuB, CwB	Slight	Slight [1]
For Weikert part of CwB, see Weikert series.		
CuC, CwC	Moderate: slope	Moderate: [1] slope
For Weikert part of CwC, see Weikert series.		
CuD, CwD	Severe: slope	Severe: [1] slope
For Weikert part of CwD, see Weikert series.		
Culleoka part of GSF and UCE	Severe: slope	Severe: [1] slope
Dormont:		
DoB	Moderate: slow permeability	Slight
DoC	Moderate: slow permeability; slope.	Moderate: slope
DoD	Severe: slope	Severe: slope
DoE	Severe: slope	Severe: slope
Dumps: Du, Dw. Properties are too variable to be rated.		
Ernest:		
ErB	Moderate: slow permeability	Slight
ErC	Moderate: slow permeability; slope.	Moderate: slope
ErD	Severe: slope	Severe: slope
EvB	Moderate: slow permeability	Slight
Rating is for both Ernest and Vandergrift parts.		
EvC	Moderate: slow permeability; slope.	Moderate: slope
Rating is for both Ernest and Vandergrift parts.		
EvD	Severe: slope	Severe: slope
Rating is for both Ernest and Vandergrift parts.		

recreation facilities

Paths and trails	Picnic areas	Playgrounds	Golf fairways
Slight	Slight	Moderate: slope	Slight.
Slight	Moderate: slope	Severe: slope	Moderate: slope.
Severe: high water table	Severe: high water table	Severe: high water table	Severe: high water table.
Severe: high water table	Severe: high water table	Severe: high water table	Severe: high water table.
Moderate: seasonal high water table.	Moderate: seasonal high water table.	Severe: seasonal high water table.	Moderate: seasonal high water table.
Moderate: seasonal high water table.	Moderate: seasonal high water table; slope.	Severe: seasonal high water table; slope.	Moderate: seasonal high water table; slope.
Slight	Slight	Moderate: seasonal high water table; slow permeability; slope.	Slight.
Slight	Moderate: slope	Severe: slope	Moderate: slope.
Slight	Slight	Moderate: slope	Slight.
Slight	Moderate: slope	Severe: slope	Moderate: slope.
Moderate: slope	Severe: slope	Severe: slope	Severe: slope.
Slight	Slight	Moderate: bedrock at a depth of 1½ to 3½ feet; slope.	Moderate: bedrock at a depth of 1½ to 3½ feet.
Slight	Moderate: slope	Severe: slope	Moderate: bedrock at a depth of 1½ to 3½ feet; slope.
Moderate: slope	Severe: slope	Severe: slope	Severe: slope.
Severe: slope	Severe: slope	Severe: shaly	Severe: slope.
Slight	Slight	Moderate: seasonal high water table; slow permeability; slope.	Slight.
Slight	Moderate: slope	Severe: slope	Moderate: slope.
Moderate: slope	Severe: slope	Severe: slope	Severe: slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Slight	Slight	Moderate: seasonal high water table; slow permeability; slope.	Slight.
Slight	Moderate: slope	Severe: slope	Moderate: slope.
Moderate: slope	Severe: slope	Severe: slope	Severe: slope.
Slight	Slight	Moderate: seasonal high water table; slow permeability; slope.	Slight.
Slight	Moderate: slope	Severe: slope	Moderate: slope.
Moderate: slope	Severe: slope	Severe: slope	Severe: slope.

TABLE 6.—*Soil limitations for*

Soil series and map symbols	Camp areas	Service buildings and dwellings without basements
Gilpin:		
GlB, GpB	Slight	Slight [1]
For the Upshur part of GpB, see UaB in the Upshur series.		
GlC, GpC	Moderate: slope	Moderate: [1] slope
For the Upshur part of GpC, see UaC in the Upshur series.		
GlD, GpD	Severe: slope	Severe: [1] slope
For the Upshur part of GpD, see the Upshur series.		
GQF, GSF	Severe: slope	Severe: [1] slope
For the Upshur part of GQF, see the Upshur series. For the Culleoka and Weikert parts of GSF, see those series.		
GrE	Severe: slope	Severe: slope; active landslides.
Rating applies to both Gilpin and Vandergrift parts.		
Guernsey:		
GuB	Moderate: slow permeability	Slight
GuC	Moderate: slow permeability; slope.	Moderate: slope
GuD	Severe: slope	Severe: slope
GvB	Moderate: slow permeability	Slight
Rating is for both Guernsey and Vandergrift parts.		
GvC	Moderate: slow permeability; slope.	Moderate: slope
Rating is for both Guernsey and Vandergrift parts.		
GvD	Severe: slope	Severe: slope
Rating is for both Guernsey and Vandergrift parts.		
Gullied land: Gx.		
Properties are too variable to be rated.		
Hazleton:		
HaB	Slight	Slight [1]
HaC	Moderate: slope	Moderate: [1] slope
HaD	Severe: slope	Severe: [1] slope
HTE	Severe: slope	Severe: [1] slope
Huntington: Hu	Moderate: hazard of flooding	Severe: hazard of flooding
Library:		
LbB	Moderate: seasonal high water table; slow permeability; too clayey.	Moderate: seasonal high water table.
LbC	Moderate: seasonal high water table; slow permeability; too clayey; slope.	Moderate: seasonal high water table; slope.
LbD	Severe: slope	Severe: slope
Lindside: Ln	Moderate: hazard of flooding	Severe: hazard of flooding
Newark: Ne	Severe: high water table	Severe: high water table; hazard of flooding.
Philo: Ph	Moderate: hazard of flooding	Severe: hazard of flooding

recreation facilities—Continued

Paths and trails	Picnic areas	Playgrounds	Golf fairways
Slight	Slight	Moderate: bedrock at a depth of 1½ to 3½ feet; slope.	Moderate: bedrock at a depth of 1½ to 3½ feet.
Slight	Moderate: slope	Severe: slope	Moderate: bedrock at a depth of 1½ to 3½ feet; slope.
Moderate: slope	Severe: slope	Severe: slope	Severe: slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Slight	Slight	Moderate: seasonal high water table; slow permeability; slope.	Slight.
Slight	Moderate: slope	Severe: slope	Moderate: slope.
Moderate: slope	Severe: slope	Severe: slope	Severe: slope.
Slight	Slight	Moderate: seasonal high water table; slow permeability; slope.	Slight.
Slight	Moderate: slope	Severe: slope	Moderate: slope.
Moderate: slope	Severe: slope	Severe: slope	Severe: slope.
Slight	Slight	Moderate: slope	Slight.
Slight	Moderate: slope	Severe: slope	Moderate: slope.
Moderate: slope	Severe: slope	Severe: slope	Severe: slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Slight	Moderate: hazard of flooding.	Moderate: hazard of flooding.	Moderate: hazard of flooding.
Moderate: seasonal high water table; too clayey.	Moderate: seasonal high water table; too clayey.	Severe: seasonal high water table.	Moderate: seasonal high water table; too clayey.
Moderate: seasonal high water table; too clayey.	Moderate: seasonal high water table; too clayey; slope.	Severe: seasonal high water table; slope.	Moderate: seasonal high water table; too clayey; slope.
Moderate: seasonal high water table; too clayey; slope.	Severe: slope	Severe: seasonal high water table; slope.	Severe: slope.
Slight	Moderate: hazard of flooding.	Moderate: seasonal high water table; hazard of flooding.	Moderate: hazard of flooding.
Severe: high water table	Severe: high water table	Severe: high water table	Severe: high water table.
Slight	Moderate: hazard of flooding.	Moderate: seasonal high water table; hazard of flooding.	Moderate: hazard of flooding.

TABLE 6.—*Soil limitations for*

Soil series and map symbols	Camp areas	Service buildings and dwellings without basements
Rainsboro:		
RaA	Moderate: slow permeability	Slight
RaB	Moderate: slow permeability	Slight
RaC	Moderate: slow permeability; slope.	Moderate: slope
Rayne:		
RyB	Slight	Slight [1]
RyC	Moderate: slope	Moderate: [1] slope
Strip mines: SmB, SmD, SmF. Properties are too variable to be rated.		
Upshur:		
UaB	Moderate: slow permeability; too clayey.	Slight
UaC	Moderate: slow permeability; too clayey; slope.	Moderate: slope; prone to landslide.
Upshur part of GpD	Severe: slope	Severe: slope; prone to landslide.
Upshur part of GQF	Severe: slope	Severe: slope; prone to landslide.
Urban land: UB, UCB, UCD, UCE, UGB, UGD, URB, URC, UWB, UWD. Properties of Urban land are too variable to be rated. For the Culleoka part of UCB and UCD, see CuB and CuD in the Culleoka series. For the Culleoka part of UCE, see the Culleoka series. For the Guernsey part of UGB and UGD, see GuB and GuD in the Guernsey series. For the Rainsboro part of URB and URC, see RaB and RaC in the Rainsboro series. For the Wharton part of UWB and UWD, see WhB and WhD in the Wharton series.		
Vandergrift: Mapped only with Ernest, Gilpin, and Guernsey soils. For ratings see those series.		
Weikert:		
WEF and GSF. Rock outcrop part of WEF not rated.	Severe: slope	Severe: slope
Weikert part of CwB	Moderate: shaly	Moderate: [1] bedrock at a depth of 1 to 1½ feet.
Weikert part of CwC	Moderate: shaly; slope	Moderate: [1] bedrock at a depth of 1 to 1½ feet; slope.
Weikert part of CwD	Severe: slope	Severe: [1] slope
Wharton:		
WhB	Moderate: slow permeability	Slight
WhC	Moderate: slow permeability; slope.	Moderate: slope
WhD	Severe: slope	Severe: slope

[1] Bedrock is normally rippable to a depth of 5 feet or more with light power equipment such as backhoes.

The population of cottontail rabbits is substantial in the city and in the suburbs where gardens, shrubbery, and lawns provide excellent habitat and protection.

The gray squirrel population within the county is fair. The highest concentration is in areas along the rivers where there are mature oaks. These areas are generally steep hillsides or vegetated flood plains in the Gilpin-Upshur-Atkins, the Gilpin-Weikert-Atkins, and the Culleoka-Weikert-Newark soil associations. There are limited numbers of fox squirrels. They are scattered among the farms where corn and small grain

recreation facilities—Continued

Paths and trails	Picnic areas	Playgrounds	Golf fairways
Slight	Slight	Moderate: seasonal high water table; slow permeability.	Slight.
Slight	Slight	Moderate: seasonal high water table; slow permeability; slope.	Slight.
Slight	Moderate: slope	Severe: slope	Moderate: slope.
Slight	Slight	Moderate: slope	Slight.
Slight	Moderate: slope	Severe: slope	Moderate: slope.
Moderate: too clayey	Moderate: too clayey	Moderate: slow permeability; too clayey; slope.	Moderate: too clayey.
Moderate: too clayey	Moderate: too clayey; slope.	Severe: slope	Moderate: too clayey; slope.
Moderate: too clayey; slope	Severe: slope	Severe: slope	Severe: slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Severe: slope	Severe: slope	Severe: shaly bedrock at a depth of 1 to 1½ feet; slope.	Severe: slope.
Moderate: shaly	Moderate: shaly	Severe: shaly; bedrock at a depth of 1 to 1½ feet.	Severe: bedrock at a depth of 1 to 1½ feet.
Moderate: shaly; slope	Moderate: shaly; slope	Severe: shaly; bedrock at a depth of 1 to 1½ feet.	Severe: bedrock at a depth of 1 to 1½ feet.
Moderate: shaly; slope	Severe: slope	Severe: shaly; bedrock at a depth of 1 to 1½ feet; slope.	Severe: bedrock at a depth of 1 to 1½ feet; slope.
Slight	Slight	Moderate: seasonal high water table; slope.	Slight.
Slight	Moderate: slope	Severe: slope	Moderate: slope.
Moderate: slope	Severe: slope	Severe: slope	Severe: slope.

fields are interspersed with mature oak woodlands.

Good to excellent populations of ringnecked pheasants are in South Fayette and Upper Saint Clair Townships, in Plum Borough, and in the northern part of Marshall Township. Idle cropland, interspersed with farms and urban developments, provides their habitat. Lesser populations are in other parts of the county, except Pittsburgh.

Grouse are rather evenly distributed throughout the county, but populations are on most steep and very steep hillsides in the Gilpin-Upshur-Atkins, the Gilpin-Weikert-Atkins, and the Culleoka-Weikert-Newark soil

associations. Red, white, and chestnut oaks, dogwoods Juneberry, and dense stands of grapevines provide excellent habitat.

White-tailed deer occur in fair numbers throughout the county except in the city areas. Higher densities are in the northern townships and in Plum Borough. Even though the population density is low compared to other counties in the state, the habitat is excellent.

Raccoons inhabit the entire county. Population densities are much higher in the city areas where the buildings provide excellent shelter. In outlying areas hunting and trapping have reduced the number of raccoons.

Red fox are found in good numbers throughout the county. The highest populations are near Pittsburgh where habitat is good but where there is little hunting and trapping. Gray fox populations are fair to poor. These animals live mainly in the strip mined areas and other mined areas. Heavy brush provides preferred habitat in the Strip mines-Guernsey-Dormont soil associations.

Muskrat populations are good in almost all rivers, ponds, lakes and streams, except those streams that have gravelly or bedrock streambeds. Mink and weasel inhabit outlying areas away from concentrated populations of people and domestic predators.

Waterfowl live near ponds and lakes, the Allegheny, Monongahela, and Ohio Rivers, and some of their tributaries. Wood ducks and mallards are most common and occur in fair to good numbers. Black ducks frequent the county in lesser numbers.

Woodcock are fairly abundant. They live in mildly alkaline areas of old strip mines which are overgrown with aspen and support good earthworm populations. They also inhabit moist, low-lying sites within strip mined areas which have not been disturbed by mining. Idle farms and vegetated flood plains also furnish good habitat. Populations are evenly distributed throughout the county except in the city areas.

Mourning doves occur in limited numbers. These live mostly in the older residential areas of the county where there are stands of mature pines. Very few large bands of migrating doves frequent the county, probably because there are not enough grain fields for feeding.

Soil suitability for wildlife habitat

Soils suitable for wildlife habitat are needed to produce desired populations of wildlife. Present land use and existing wildlife populations are also important, but these require onsite investigation for evaluation and are not discussed in the soil survey. Soil interpretations should be used along with other information in a total study of an area's resources and suitability for the production of wildlife.

Every species of wildlife requires certain types of vegetation and water for food and cover. Proper management of water and plants to produce suitable habitat is the most effective way to maintain and improve wildlife populations. Through knowledge of the properties of soils, it is possible to predict suitability for production of habitat elements essential to wildlife.

In table 7, the soils of Allegheny County are rated according to their suitability to produce essential elements of wildlife habitat and kinds of wildlife habitat. The ratings are based on a modification of a system (*1*) proposed in 1963. Each rating reflects only the characteristics of the individual, unmodified soil.

The elements of wildlife habitat in table 7 are described in the following paragraphs.

Grain and seed crops are domestic grain and seed producing annual plants such as corn, wheat, and millet.

Grasses and legumes are domestic perennial grasses and herbaceous legumes such as timothy, alfalfa, and reed canary grass.

Wild herbaceous plants are wild grasses and weeds such as goldenrod and pokeweed.

Hardwood trees are deciduous trees, shrubs and vines such as oaks, dogwoods, grapes, and briars.

Coniferous plants are cone-bearing trees and shrubs such as pines, cedars, and yews.

Wetland plants are wild herbaceous plants, such as smartweeds, bullrushes, reed canary grass, and cattails, grown in moist to wet areas. Submerged and floating aquatic plants are not included.

Shallow water plants are in areas where water depth does not exceed 5 feet. Such areas are natural or are created by low dikes, level ditches, and water control devices on marshy streams.

The kinds of wildlife in table 7 are defined in the following paragraphs.

Openland wildlife are birds and mammals of cropland, pastures, meadows, and areas overgrown with grasses, herbs, vines, or shrubbery plants. Examples are quail, pheasant, doves, woodcock, cottontail rabbits, meadowlarks, killdeer, and field sparrows.

Woodland wildlife are birds and mammals of woodlands containing hardwood or coniferous trees and shrubs, or mixtures of both. Examples are grouse, turkeys, deer, squirrels, wood thrushes, warblers, and vireos.

Wetland wildlife are birds and mammals of marshes, swamps and open water areas. Examples are ducks, geese, rails, snipe, muskrats, and beaver.

The ratings shown in table 7 indicate the suitability of the soil to produce various habitat elements and kinds of wildlife habitat. A rating of *good* indicates that habitat generally is easily created, improved, or maintained. There are few soil limitations in management and satisfactory results can be expected.

A rating of *fair* indicates that habitat usually can be created, improved, or maintained. Moderate soil limitations affect management. Moderate intensity of management and frequent attention may be required for satisfactory results.

A rating of *poor* indicates that habitat usually can be created or improved, but severe soil limitations affect management and may make it difficult and expensive to maintain. Results are questionable.

A rating of *very poor* indicates that it is impractical to create, improve, or maintain habitat. Unsatisfactory results are probable.

It should be noted that the ratings indicate only potential suitability for wildlife habitat. Changes in land use may modify the local environment and thus alter the species of wildlife which inhabit the area. Also, animals move from place to place and utilize

more than one kind of habitat, and this is not considered in making the ratings.

Strip mines offer many opportunities for developing water impoundments and food and cover for wildlife. They require onsite investigations to determine limitations (*7*).

Woodland [5]

Allegheny County originally had a dense cover of trees. Clearing for housing and farming and commercial cutting, however, have eliminated all of the virgin stands of timber. At present, 37 percent of the county is in commercial woodland, all of it second or third growth. Approximately 46 percent of the commercial forest consists of sawtimber and about 15 percent of poletimber (*5*).

The main forest types in the existing stands and the approximate percentage of total woodland in the county are as follows (*5*):

	Percent
White pine-hemlock Fifty percent or more of the stand is eastern white pine, red pine, or hemlock, or a combination of these.	4
Oak-hickory Fifty percent or more of the stand is upland oaks or hickory, singly or in combination. The yellow-poplar-oak forest type is included.	27
Elm-ash-red maple Fifty percent or more of the stand is elm, ash, or red maple, or a combination of these.	22
Maple-beech-birch Fifty percent or more of the stand is sugar maple, beech, or yellow birch, or a combination of these. The black cherry forest type is included.	17
Aspen-birch Fifty percent or more of the stand is aspen, paper birch, gray birch, or pin cherry, or a combination of these.	27
Virginia-pitch pine Forests in which 50 percent or more of the stand is Virginia pine or pitch pine.	1
Other oak types	2

In general, the soils in the county are capable of supporting a good growth of red oak, yellow-poplar, ash, and white pine. Presently, many stands are made up predominantly of red maple, beech, elm, chestnut oak, scarlet oak, and white oak (fig. 18).

[5] By V. C. MILES, woodland specialist, Soil Conservation Service.

Figure 18.—**A wooded area of Gilpin, Weikert, and Culleoka shaly silt loams, very steep.**

TABLE 7.—*Suitability of the soils for elements of*

[Dumps (Du and Dw), Gullied land (Gx), Strip mines (SmB, SmD, and SmF), and the Rock outcrop part of WEF are not

Soil series and map symbols	Elements of wildlife habitat			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees
Allegheny variant:				
AgB	Good	Good	Good	Good
AgC	Fair	Good	Good	Good
Atkins: At	Poor	Fair	Fair	Fair
Brinkerton: BrB	Poor	Fair	Fair	Good
Cavode:				
CaB	Fair	Good	Good	Good
CaC	Fair	Good	Good	Good
Clarksburg:				
CkB	Good	Good	Good	Good
CkC	Fair	Good	Good	Good
Clymer:				
CmB	Good	Good	Good	Good
CmC	Fair	Good	Good	Good
CmD	Poor	Fair	Good	Good
Culleoka:				
CuB	Good	Good	Good	Good
CuC	Fair	Good	Good	Good
CuD	Poor	Fair	Good	Good
CwB, CwC, CwD	Poor	Poor	Poor	Poor
Dormont:				
DoB	Good	Good	Good	Good
DoC	Fair	Good	Good	Good
DoD	Poor	Fair	Good	Good
DoE	Very poor	Fair	Good	Good
Ernest:				
ErB	Good	Good	Good	Good
ErC	Fair	Good	Good	Good
ErD	Poor	Fair	Good	Good
EvB	Fair	Good	Good	Good
EvC	Fair	Good	Good	Good
EvD	Poor	Fair	Good	Good
Gilpin:				
GlB	Fair	Good	Good	Good
GlC	Fair	Good	Good	Good
GlD	Poor	Fair	Good	Good
GpB	Fair	Good	Good	Good
GpC	Fair	Good	Good	Good
GpD	Poor	Fair	Good	Good
GQF	Very poor	Poor	Good	Good
GrE	Very poor	Fair	Good	Good
GSF	Very poor	Poor	Poor	Poor
Guernsey:				
GuB	Good	Good	Good	Good
GuC	Fair	Good	Good	Good
GuD	Poor	Fair	Good	Good
GvB	Fair	Good	Good	Good
GvC	Fair	Good	Good	Good
GvD	Poor	Fair	Good	Good
Hazleton:				
HaB	Good	Good	Good	Good
HaC	Fair	Good	Good	Good
HaD	Poor	Fair	Good	Good
HTE	Very poor	Poor	Good	Good
Huntington: Hu	Good	Good	Good	Good

wildlife habitat and kinds of wildlife

listed in the table because their properties are too variable to be rated. These mapping units require onsite investigation]

Elements of wildlife habitat—Continued			Kinds of wildlife		
Coniferous plants	Wetland plants	Shallow water plants	Openland	Woodland	Wetland
Good	Poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Good	Good	Very poor.
Fair	Good	Good	Fair	Fair	Good.
Good	Poor	Very poor	Fair	Good	Very poor.
Good	Poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Good	Good	Very poor.
Good	Poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Good	Good	Very poor.
Good	Poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Fair	Good	Very poor.
Good	Poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Fair	Good	Very poor.
Poor	Very poor	Very poor	Poor	Poor	Very poor.
Good	Poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Fair	Good	Very poor.
Good	Very poor	Very poor	Fair	Good	Very poor.
Good	Poor	Very poor	Good	Good	Very poor.
Good	Poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Fair	Good	Very poor.
Good	Poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Fair	Good	Very poor.
Good	Poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Fair	Good	Very poor.
Good	Very poor	Very poor	Fair	Good	Very poor.
Good	Very poor	Very poor	Poor	Good	Very poor.
Good	Very poor	Very poor	Fair	Good	Very poor.
Poor	Very poor	Very poor	Poor	Poor	Very poor.
Good	Poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Fair	Good	Very poor.
Good	Poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Fair	Good	Very poor.
Good	Poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Fair	Good	Very poor.
Good	Very poor	Very poor	Poor	Good	Very poor.
Good	Poor	Very poor	Good	Good	Very poor.

TABLE 7.—*Suitability of the soils for elements of*

Soil series and map symbols	Elements of wildlife habitat			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees
Library:				
LbB	Fair	Good	Good	Good
LbC	Fair	Good	Good	Good
LbD	Poor	Fair	Good	Good
Lindside: Ln	Good	Good	Good	Good
Newark: Ne	Poor	Fair	Fair	Fair
Philo: Ph	Good	Good	Good	Good
Rainsboro:				
RaA	Good	Good	Good	Good
RaB	Good	Good	Good	Good
RaC	Fair	Good	Good	Good
Rayne:				
RyB	Good	Good	Good	Good
RyC	Fair	Good	Good	Good
Upshur:				
UaB	Good	Good	Good	Good
UaC	Fair	Good	Good	Good
Urban land: UB, UCB, UCD, UCE, UGB, UGD, URB, URC, UWB, UWD. Properties of Urban land are too variable to be rated. For the Culleoka part of UCB, UCD, and UCE, see CuB, CuD, and CwD in the Culleoka series. For the Guernsey part of UGB and UGD, see GuB and GuD in the Guernsey series. For the Rainsboro part of URB and URC, see RaB and RaC in the Rainsboro series. For the Wharton part of UWB and UWD, see WhB and WhD in the Wharton series.				
Weikert: WEF	Very poor	Very poor	Very poor	Poor
Wharton:				
WhB	Good	Good	Good	Good
WhC	Fair	Good	Good	Good
WhD	Poor	Fair	Good	Good

Sixty-three percent of the existing woodland in the county is on soils that are excellent, very good, or good woodland sites. Thirty-four percent is on soils that are fair woodland sites, and 3 percent on soils that are poor sites.

Strip mines require onsite investigations to determine suitability for woodland and adapted species (*7*).

Table 8 rates the soils of the county as to site quality, hazards, and species suitability.

Site quality is an indication of the ability of a soil to produce timber. It is based on site index, which is defined as the average height of the dominant and codominant trees in a stand at 50 years. From the site indexes and yield tables, users can predict the approximate volume stands will have at a given age.

The site indexes on sample plots in this county and adjacent counties were used to establish the site quality ratings in table 8 for yellow-poplar (*6*) and upland oak (*8*).

Site ratings for oak are based on the average height attained by the dominant and codominant trees at 50 years. A site index of 85 or better is rated excellent, and the expected yield at 50 years is 13,750 or more board feet per acre. Published data for oak do not go beyond site index 80 (International rule). A site index of 75 to 84 is rated *very good,* and the expected yield is about 13,750 board feet per acre. A site index of 65 to 74 is rated *good,* and the expected yield is about 9,750 board feet per acre. A site index of 55 to 64 is rated *fair,* and the expected yield is about 6,300 board feet per acre. A site index of less than 54 is rated *poor,* and the expected yield is less than 3,250 board feet per acre.

An excellent site for yellow-poplar has a site index

wildlife habitat and kinds of wildlife—Continued

Elements of wildlife habitat—Continued			Kinds of wildlife		
Coniferous plants	Wetland plants	Shallow water plants	Openland	Woodland	Wetland
Good	Poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Fair	Good	Very poor.
Good	Poor	Poor	Good	Good	Poor.
Fair	Good	Good	Fair	Fair	Good.
Good	Poor	Poor	Good	Good	Poor.
Good	Poor	Poor	Good	Good	Poor.
Good	Poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Good	Good	Very poor.
Good	Poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Good	Good	Very poor.
Good	Poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Good	Good	Very poor.
Poor	Very poor	Very poor	Very poor	Poor	Very poor.
Good	Very poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Fair	Good	Very poor.

of 95 or better, and the expected yield at 50 years is 32,150 board feet per acre. A site index of 85 to 95 is rated *very good,* and the expected yield is about 24,400 board feet per acre. A *good* site has a site index of 75 to 85 and is expected to yield 17,620 board feet per acre; a *fair* site (site index 65 to 75), is expected to yield 11,400 board feet per acre; and a *poor* site (site index 55 to 65) is expected to yield 5,600 board feet per acre.

The site indexes for white pine, sugar maple, ash, and larch vary somewhat but follow about the same pattern as those of yellow-poplar and oak. Information on site indexes for other species can be obtained from the Soil Conservation Service and the Bureau of Forestry, Pennsylvania Department of Environmental Resources.

The hazards in managing woodland are erosion, equipment limitation, seedling mortality, plant competition, and windthrow hazard.

The erosion hazard indicates the intensity of practices needed to control erosion. A rating of *slight* means that few if any practices are needed. A rating of *moderate* means that measures are needed to control erosion in skid trails and logging roads immediately after wood crops are harvested. A rating of *severe* means that harvesting and other operations should be done across the slope so far as possible; that skid trails and logging roads should have the slightest gradient possible; that water disposal systems must be carefully maintained during logging; and that measures are needed to control erosion, especially gullying, in skid trails and logging roads immediately after logging.

Equipment limitations are affected by properties of the soil and topography. Slope, stoniness, and wetness

TABLE 8.—*Soil interpretations*

[Dumps (Du and Dw), Gullied land (Gx) and Strip mines (SmB, SmD, and SmF) are not listed in the table because they are

Soil series and map symbols	Site quality	Management problems		
		Erosion hazard	Equipment limitations	Seedling mortality
Allegheny variant: AgB, AgC	Very good	Slight	Slight	Slight
Atkins: At	Fair	Slight	Severe	Severe
Brinkerton: BrB	Good	Slight	Severe	Severe
Cavode: CaB	Very good	Slight	Moderate	Moderate
CaC	Very good	Moderate	Moderate	Moderate
Clarksburg: CkB	Excellent	Slight	Slight	Slight
CkC	Excellent	Moderate	Slight	Slight
Clymer: CmB, CmC	Good	Slight	Slight	Slight
CmD	Good	Slight	Moderate	Slight
Culleoka: CuB, CuC	Very good	Slight	Slight	Moderate
CuD	Very good	Moderate	Moderate	Moderate
CwB, CwC	Fair	Slight	Slight	Severe
CwD	Fair	Slight	Moderate	Severe
Dormont: DoB	Very good	Slight	Slight	Slight
DoC	Very good	Moderate	Slight	Slight
DoD, DoE	Very good	Severe	Moderate	Slight
Ernest: ErB	Very good	Slight	Slight	Slight
ErC	Very good	Moderate	Slight	Slight
ErD	Very good	Severe	Moderate	Slight
EvB	Very good	Slight	Slight	Slight
EvC	Very good	Moderate	Slight	Slight
EvD	Very good	Severe	Moderate	Slight

for woodland

generally not suitable for woodland. Onsite investigations of these mapping units are needed to determine their suitability]

Management problems—Continued			Trees to favor in existing stands	Trees for planting or seeding
Plant competition for—		Windthrow hazard		
Conifers	Hardwoods			
Severe	Moderate	Slight	Red oak, ash, yellow-poplar, black walnut, sugar maple, white pine, red maple.	Yellow-poplar, black walnut, larch, Norway spruce, white pine, Virginia pine.
Severe	Severe	Moderate	Pin oak, red maple, sycamore.	White pine, white spruce.
Moderate	Moderate	Severe	Red oak, yellow-poplar, ash, sugar maple, red maple.	Yellow-poplar, larch, Norway spruce, white spruce, white pine.
Severe	Severe	Moderate	Yellow-poplar, red oak, ash, sugar maple, red maple, white pine.	Yellow-poplar, larch, white pine, white spruce, Norway spruce.
Severe	Severe	Moderate	Yellow-poplar, red oak, ash, sugar maple, red maple, white pine.	Yellow-poplar, larch, white pine, white spruce, Norway spruce.
Severe	Moderate	Slight	Yellow-poplar, red oak, ash, sugar maple.	Yellow-poplar, larch, Norway spruce, white pine.
Severe	Moderate	Slight	Yellow-poplar, red oak, ash, sugar maple.	Yellow-poplar, larch, Norway spruce, white pine.
Moderate	Slight	Slight	Red oak, yellow-poplar, ash, sugar maple, Virginia pine, white pine.	Yellow-poplar, larch, red pine, Norway spruce, white pine, Virginia pine.
Moderate	Slight	Slight	Red oak, yellow-poplar, ash, sugar maple, Virginia pine, white pine.	Yellow-Poplar, larch, red pine, Norway spruce, white pine, Virginia pine.
Severe	Moderate	Slight	Red oak, ash, sugar maple, yellow-poplar.	Yellow-poplar, larch, Norway spruce, white pine, red pine, Virginia pine.
Severe	Moderate	Slight	Red oak, ash, sugar maple, yellow-poplar.	Yellow-poplar, larch, Norway spruce, white pine, red pine, Virginia pine.
Slight	Slight	Moderate	Red oak, black oak, Virginia pine, white pine.	Virginia pine, red pine, white pine.
Slight	Slight	Moderate	Red oak, black oak, Virginia pine, white pine.	Virginia pine, red pine, white pine.
Severe	Moderate	Slight	Red oak, ash, sugar maple, yellow-poplar.	Yellow-poplar, larch, Norway spruce, white pine.
Severe	Moderate	Slight	Red oak, ash, sugar maple, yellow-poplar.	Yellow-poplar, larch, Norway spruce, white pine.
Severe	Moderate	Slight	Red oak, ash, sugar maple, yellow-poplar.	Yellow-poplar, larch, Norway spruce, white pine.
Severe	Moderate	Slight	Red oak, ash, sugar maple, yellow-poplar.	Yellow-poplar, larch, Norway spruce, white pine.
Severe	Moderate	Slight	Red oak, ash, sugar maple, yellow-poplar.	Yellow-poplar, larch, Norway spruce, white pine.
Severe	Moderate	Slight	Red oak, ash, sugar maple, yellow-poplar.	Yellow-poplar, larch, Norway spruce, white pine.
Severe	Moderate	Slight	Red oak, ash, sugar maple, yellow-poplar.	Yellow-poplar, larch, Norway spruce, white pine.
Severe	Moderate	Slight	Red oak, ash, sugar maple, yellow-poplar.	Yellow-poplar, larch, Norway spruce, white pine.
Severe	Moderate	Slight	Red oak, ash, sugar maple, yellow poplar.	Yellow-poplar, larch, Norway spruce, white pine.

TABLE 8.—*Soil interpretations*

Soil series and map symbols	Site quality	Management problems		
		Erosion hazard	Equipment limitations	Seedling mortality
Gilpin:				
GlB, GlC	Very good	Slight	Slight	Moderate
GlD	Very good	Moderate	Moderate	Moderate
GpB, GpC	Very good	Slight	Slight	Moderate
GpD	Very good	Moderate	Moderate	Moderate
GQF	Very good	Severe	Severe	Moderate
GrE	Very good	Severe	Severe	Moderate
GSF	Fair	Moderate	Severe	Severe
Guernsey:				
GuB	Very good	Slight	Slight	Slight
GuC	Very good	Moderate	Slight	Slight
GuD	Very good	Severe	Moderate	Slight
GvB	Very good	Slight	Slight	Slight
GvC	Very good	Moderate	Slight	Slight
GvD	Very good	Severe	Moderate	Slight
Hazleton:				
HaB	Good	Slight	Slight	Slight
HaC, HaD	Good	Slight	Moderate	Slight
HTE	Good	Moderate	Severe	Slight
Huntington: Hu	Excellent	Slight	Slight	Slight
Library:				
LbB	Very good	Slight	Moderate	Moderate
LbC	Very good	Moderate	Moderate	Moderate
LbD	Very good	Severe	Moderate	Moderate
Lindside: Ln	Excellent	Slight	Slight	Slight
Newark: Ne	Fair	Slight	Severe	Severe

for woodland—Continued

Management problems—Continued			Trees to favor in existing stands	Trees for planting or seeding
Plant competition for—		Windthrow hazard		
Conifers	Hardwoods			
Severe	Moderate	Slight	Red oak, ash, sugar maple, yellow-poplar, Virginia pine, white pine.	Yellow-poplar, larch, Norway spruce, red pine, Virginia pine, white pine.
Severe	Moderate	Slight	Red oak, ash, sugar maple, yellow-poplar, Virginia pine, white pine.	Yellow-poplar, larch, Norway spruce, red pine, Virginia pine, white pine.
Severe	Moderate	Slight	Ash, sugar maple, yellow-poplar, Virginia pine, red oak, white pine.	Yellow-poplar, larch, Norway spruce, red pine, Virginia pine, white pine.
Severe	Moderate	Slight	Ash, sugar maple, yellow-poplar, Virginia pine, red oak, white pine.	Yellow-poplar, larch, Norway spruce, red pine, Virginia pine, white pine.
Severe	Moderate	Slight	Ash, sugar maple, yellow-poplar, Virginia pine, red oak, white pine.	Yellow-poplar, larch, Norway spruce, red pine, Virginia pine, white pine.
Severe	Moderate	Slight	Red oak, ash, sugar maple, yellow-poplar.	Yellow-poplar, larch, Norway spruce, red pine, Virginia pine, white pine.
Slight	Slight	Moderate	Red oak, black oak, chestnut oak, Virginia pine, white pine.	Virginia pine, red pine, white pine, pitch pine.
Severe	Moderate	Slight	Red oak, ash, sugar maple, yellow-poplar.	Yellow-poplar, larch, white pine, Norway spruce.
Severe	Moderate	Slight	Red oak, ash, sugar maple, yellow-poplar.	Yellow-poplar, larch, white pine, Norway spruce.
Severe	Moderate	Slight	Red oak, ash, sugar maple, yellow-poplar.	Yellow-poplar, larch, white pine, Norway spruce.
Severe	Moderate	Slight	Red oak, ash, sugar maple, yellow-poplar.	Yellow-poplar, larch, white pine, Norway spruce.
Severe	Moderate	Slight	Red oak, ash, sugar maple, yellow-poplar.	Yellow-poplar, larch, white pine, Norway spruce.
Severe	Moderate	Slight	Red oak, ash, sugar maple, yellow-poplar.	Yellow-poplar, larch, white pine, Norway spruce.
Moderate	Slight	Slight	Red oak, black oak, ash, sugar maple, red maple, yellow-poplar.	Yellow-poplar, larch, Norway spruce, red pine, Virginia pine, white pine.
Moderate	Slight	Slight	Red oak, black oak, ash, sugar maple, red maple, yellow-poplar.	Yellow-poplar, larch, Norway spruce, red pine, Virginia pine, white pine.
Moderate	Slight	Slight	Red oak, black oak, ash, sugar maple, red maple, yellow-poplar.	Yellow-poplar, larch, Norway spruce, red pine, Virginia pine, white pine.
Severe	Moderate	Slight	Red oak, ash, sugar maple, yellow-poplar, black walnut.	Yellow-poplar, larch, Norway spruce, white pine, black walnut.
Severe	Severe	Moderate	Red oak, ash, sugar maple, red maple, yellow-poplar.	White pine, yellow-poplar, larch, Norway spruce, white spruce.
Severe	Severe	Moderate	Red oak, ash, sugar maple, red maple, yellow-poplar.	White pine, yellow-poplar, larch, Norway spruce, white spruce.
Severe	Severe	Moderate	Red oak, ash, sugar maple, red maple, yellow-poplar.	White pine, yellow-poplar, larch, Norway spruce, white spruce.
Severe	Moderate	Slight	Red oak, ash, sugar maple, yellow-poplar, black walnut.	Yellow-poplar, black walnut, larch, Norway spruce, white pine.
Severe	Severe	Moderate	Red maple, sycamore	White pine, white spruce.

TABLE 8.—*Soil interpretations*

Soil series and map symbols	Site quality	Management problems		
		Erosion hazard	Equipment limitations	Seedling mortality
Philo: Ph	Excellent	Slight	Slight	Slight
Rainsboro:				
RaA, RaB	Good	Slight	Slight	Slight
RaC	Good	Moderate	Slight	Slight
Rayne: RyB, RyC	Good	Slight	Slight	Slight
Upshur:				
UaB	Good	Slight	Moderate	Slight
UaC	Good	Moderate	Moderate	Slight
Urban land: UB, UCB, UCD, UCE, UGB, UGD, URB, URC, UWB, UWD. Properties of Urban land are too variable to be rated. For the Culleoka part of UCB, UCD, and UCE, see CuB, CuD, and CwD in the Culleoka series. For the Guernsey part of UGB and UGD, see GuB and GuD in the Guernsey series. For the Rainsboro part of URB and URC, see RaB and RaC in the Rainsboro series. For the Wharton part of UWB and UWD, see WhB and WhD in the Wharton series.				
Weikert: WEF. Rock outcrop part not rated.	Fair	Moderate	Severe	Severe
Wharton:				
WhB	Very good	Slight	Slight	Slight
WhC	Very good	Moderate	Slight	Slight
WhD	Very good	Severe	Moderate	Slight

are principal limiting characteristics of the soil. A rating of *slight* means that there are very few limitations. A rating of *moderate* means that there are some stones and boulders, slopes are steeper than 15 percent and less than 25 percent, or the soil is wet for as much as 3 months of the year. A rating of *severe* means that slopes are steeper than 25 percent or the soils are stony or subject to prolonged wetness. Track-type equipment is best for general use, and winches or other special equipment may be needed.

Seedling mortality refers to the loss of seedlings, natural or planted, as a result of unfavorable soil characteristics. A rating of *slight* means that no more than 25 percent of the seedlings will die. A rating of *moderate* means that the loss will be between 25 and 50 percent, and a rating of *severe* means that the loss will be more than 50 percent.

Plant competition refers to the rate at which brush, grass, and undesirable trees are likely to invade woodland stands. A rating of *slight* means that competition does not prevent adequate natural regeneration and early growth or interfere with the development of planted seedlings. A rating of *moderate* means that competition delays natural regeneration and interferes with the established and early growth of seedlings but does not prevent the development of fully stocked nor-

for woodland—Continued

Management problems—Continued			Trees to favor in existing stands	Trees for planting or seeding
Plant competition for—		Windthrow hazard		
Conifers	Hardwoods			
Severe	Moderate	Slight	Red oak, ash, sugar maple, yellow-poplar, black walnut, white pine.	Yellow-poplar, black walnut, larch, Norway spruce, white pine.
Moderate	Slight	Slight	Red oak, ash, sugar maple, yellow-poplar.	Yellow-poplar, larch, Norway spruce, white pine, Virginia pine, red pine.
Moderate	Slight	Slight	Red oak, ash, sugar maple, yellow-poplar.	Yellow-poplar, larch, Norway spruce, white pine, Virginia pine, red pine.
Severe	Moderate	Slight	Red oak, black oak, ash, sugar maple, yellow-poplar.	Yellow-poplar, larch, Norway spruce, white pine.
Moderate	Slight	Slight	Red oak, ash, sugar maple, Virginia pine, yellow pine.	Yellow-poplar, larch, Norway spruce, white pine, Virginia pine.
Moderate	Slight	Slight	Red oak, ash, sugar maple, Virginia pine, yellow pine.	Yellow-poplar, larch, Norway spruce, white pine, Virginia pine.
Slight	Slight	Moderate	Red oak, black oak, chestnut oak, Virginia pine, white pine.	Virginia pine, red pine, white pine, pitch pine.
Severe	Moderate	Slight	Red oak, ash, sugar maple, yellow-poplar, white pine.	Larch, yellow-poplar, white pine, Norway spruce.
Severe	Moderate	Slight	Red oak, ash, sugar maple, yellow-poplar, white pine.	Larch, yellow-poplar, white pine, Norway spruce.
Severe	Moderate	Slight	Red oak, ash, sugar maple, yellow-poplar, white pine.	Larch, yellow-poplar, white pine, Norway spruce.

mal stands. A rating of *severe* means that competition prevents adequate restocking, either natural or artificial, without intensive site preparation, weeding, and other treatment.

Windthrow hazard represents an evaluation of the factors that control the development of tree roots and, consequently, the possibility that the wind will uproot trees. A rating of *slight* means that normally no trees are blown by wind. A rating of *moderate* means that some trees will be blown down when the soil is wet and the wind high. A rating of *severe* means that many trees will be blown down if the soil is wet and the wind moderate or high.

General Management for Crops and Pasture

The main crops grown in Allegheny County are corn, oats, wheat, sweet corn, tomatoes, and apples.

Some principles of management apply to all soils suitable for farm crops and pasture throughout the county, although the individual soils or groups of soils require different kinds of management. These general principles of management are discussed in the following paragraphs.

Many soils in the county need lime or fertilizer or both. The amounts needed depend on the natural content of lime and plant nutrients, which are determined

by laboratory analyses of soil samples; on the needs of the crops; and on the level of yield desired. Only general suggestions for applications of lime and fertilizer are given in this survey.

Most soils of Allegheny County were never high in content of organic matter, and to build up the content to a high level is not economical. It is important, however, to return organic matter by adding farm manure, leaving plant residue on the surface, and growing sod crops, cover crops, and green-manure crops.

Tillage tends to break down soil structure. It should be kept to a minimum necessary to prepare a seedbed and control weeds. Maintaining the organic-matter content of the plow layer also helps to retain soil structure.

On wet soils such as Atkins silt loam, yields of cultivated crops can be increased by open-ditch drainage or tile drainage. Tile drains are costly to install, but they generally provide better drainage than open ditches. Soils that have a fragipan are difficult to drain; they can generally be drained better by open ditches than by tile. Open-ditch drainage is more effective if the ditches intercept the water as it moves horizontally on top of the fragipan. For drainage by either tile or open ditches, suitable outlets are needed.

All gently sloping and steeper soils that are cultivated are subject to erosion. Runoff and erosion occur mostly while a cultivated crop is growing or soon after it has been harvested. On erodible soils such as Gilpin silt loam, 8 to 15 percent slopes, a cropping system that controls runoff and erosion is needed, along with erosion control practices. As used here, cropping system means the sequence of crops grown and management that includes minimum tillage, mulch planting, use of crop residue, growing cover crops and green-manure crops, and use of lime and fertilizer. Other erosion control practices are contour cultivation, terracing, contour strip-cropping, diversion of runoff, and use of grassed waterways (fig. 19). The effectiveness of a particular combination of these measures differs from one soil to another, but different combinations can be equally effective on the same soil. The local representative of the Soil Conservation Service can assist in planning an effective combination of practices.

Pasture is effective in controlling erosion on all but a few of the soils. A high level of pasture management is needed on some soils to provide enough ground cover to keep the soil from eroding. This provides fertilization, control of grazing, selection of pasture seeding mixtures, and helps maintain good ground cover and forage for grazing. Livestock should be rotated from one pasture field to another to provide rest periods for the pasture after each grazing period. It is important on some soils that pasture seeding mixtures be selected that will require a minimum of renovation to maintain good ground cover and forage.

Figure 19.—**Contour stripcropping on Dormont silt loam in the foreground and Culleoka silt loam in the background.**

Capability Grouping

Some readers, particularly those who farm on a large scale, may find it practical to use and manage alike some of the different kinds of soil on their farm. These readers can make good use of the capability classification system, a grouping that shows, in a general way, the suitability of soils for most kinds of farming.

The grouping is based on limitations of soils when used for field crops, the risk of damage when they are farmed, and the way the soils respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to rice, cranberries, horticultural crops, or other crops that require special management.

Those familiar with the capability classification can infer from it much about the behavior of soils when used for other purposes, but this classification is not a substitute for interpretations designed to show suitability and limitations for range, for forest trees, or for engineering.

In the capability system, all kinds of soil are grouped at three levels: the class, the subclass, and the unit. The eight classes in the capability system and the subclasses and units in Allegheny County are described in the list that follows. The unit designation for each soil is given in the Guide to Mapping Units.

Class I. Soils that have few limitations that restrict their use.
- (No subclasses)
  - Unit I–1. Deep, nearly level, well-drained silt loams on flood plains.

Class II. Soils that have moderate limitations that reduce the choice of plants or require moderate conservation practices.
- Subclass IIe. Soils that are subject to moderate erosion unless protected.
  - Unit IIe–1. Deep, nearly level and gently sloping, well-drained silt loams and loams on uplands and terraces.
  - Unit IIe–2. Moderately deep, nearly level and gently sloping, well-drained silt loams on uplands.
  - Unit IIe–3. Deep, nearly level and gently sloping, moderately well drained silt loams on uplands and terraces.
- Subclass IIw. Soils that are moderately limited because of excess water.
  - Unit IIw–1. Deep, nearly level, moderately well drained silt loams on flood plains.
  - Unit IIw–2. Deep, nearly level, moderately well drained silt loams on terraces.

Class III. Soils that have severe limitations that reduce the choice of plants, require special conservation practices, or both.
- Subclass IIIe. Soils that are subject to severe erosion if they are cultivated and not protected.
  - Unit IIIe–1. Deep, sloping, well-drained silt loams and loams on uplands and terraces.
  - Unit IIIe–2. Moderately deep, sloping, well-drained silt loams on uplands.
  - Unit IIIe–3. Deep, moderately deep and shallow, gently sloping, well-drained silt loams, shaly silt loams, and silty clay loams on uplands.
  - Unit IIIe–4. Deep, sloping, moderately well drained silt loams on uplands and terraces.
  - Unit IIIe–5. Deep, sloping, somewhat poorly drained silt loams and silty clay loams on uplands.
- Subclass IIIw. Soils that are severely limited for cultivation because of excess water.
  - Unit IIIw–1. Deep, nearly level, poorly drained to somewhat poorly drained silt loams on flood plains.
  - Unit IIIw–2. Deep, nearly level and gently sloping, somewhat poorly drained silt loams and silty clay loams on uplands.

Class IV. Soils that have very severe limitations that reduce the choice of plants, require very careful management, or both.
- Subclass IVe. Soils that are subject to very severe erosion if they are cultivated and not protected.
  - Unit IVe–1. Deep, moderately steep, well-drained silt loams and loams on uplands.
  - Unit IVe–2. Moderately deep, moderately steep, well-drained silt loams on uplands.
  - Unit IVe–3. Deep, moderately deep and shallow, sloping, well-drained silt loams, shaly silt loams, and silty clay loams on uplands.
  - Unit IVe–4. Deep, moderately steep, moderately well drained silt loams on uplands.
  - Unit IVe–5. Deep, moderately steep, somewhat poorly drained silty clay loams on uplands.
- Subclass IVw. Soils that are very severely limited because of excess water.
  - Unit IVw–1. Deep, nearly level and gently sloping, poorly-drained silt loams on uplands.

Class V. Soils that are subject to little or no erosion but have other limitations that are impractical to remove, and that limit their use largely to pasture, woodland, or wildlife habitat. (None in Allegheny County)

Class VI. Soils that have severe limitations that make them generally unsuitable for cultivation and limit their use largely to pasture, woodland, or wildlife habitat.
- Subclass VIe. Soils that are severely limited, chiefly by the hazard of erosion, unless protective cover is maintained.
  - Unit VIe–1. Deep, moderately deep and shallow, moderately steep, well-drained silt loams, shaly silt loams, and silty clay loams on uplands.
  - Unit VIe–2. Deep, steep, moderately well drained silt loams on uplands.

Class VII. Soils that have very severe limitations that make them unsuitable for cultivation and restrict their use largely to woodland or wildlife habitat.
- Subclass VIIe. Soils that are very severely limited, chiefly by the hazard of erosion, unless protective cover is maintained.
  - Unit VIIe–1. Deep, moderately deep, and

shallow, steep and very steep, well-drained loams, silt loams, shaly silt loams, and silty clay loams on uplands.

Unit VIIe–2. Deep and moderately deep, moderately steep and steep, well drained and moderately well drained silt loams on uplands.

Subclass VIIs. Soils that are very severely limited by low available water capacity, stones, or shallowness to bedrock.

Unit VIIs–1. Rock outcrops and shallow, steep and very steep, well-drained shaly silt loams on uplands.

Class VIII. Soils and landforms that have limitations which preclude their use for commercial crop production and restrict their use to recreation, water supply, esthetic purposes, or wildlife habitat. (None in Allegheny County)

Estimated Yields [6]

Table 9 shows the estimated yields for representative field crops grown in the county, including hay and pasture. Suitability ratings are also made for vegetable crops and apples. The predictions are the average that can be expected for a period of ten years or more under improved management. Soils that are not suitable for farming are not listed in the table.

Improved management is used by most farmers in the county. Most of the adapted crop varieties, fertilization rates, and insect and disease control measures currently recommended are used. Management practices are applied at the proper time and in such a way as to be of greatest effectiveness. Such soil and water conservation practices as minimum tillage, contour tillage, stripcropping, crop residue management, and the use of diversions, drainage, and waterways, or other practices recommended by the Agricultural Extension Service and the Soil Conservation Service in Allegheny County are used. Irrigation is not considered in arriving at these yields. The yields are not intended to be maximum yields obtainable, but generally represent yields for the county. It is expected that yields will increase 10 to 25 percent by 1985, as a result of the development of new varieties and improved technology of production. Yields increased approximately 2 percent per year in Pennsylvania during the 1960's.

Improved hay and pasture management uses surface and internal drainage practices where needed to provide optimum growing conditions. Lime and fertilizer are applied according to crop needs as indicated by soil tests. Hay stands are re-established regularly using adapted varieties. Hay making is timely, and pasture grazing is rotated, deferred, or otherwise controlled as needed.

In table 9 the suitability of the soil for sweet corn, tomatoes, and apples is given. The ratings for sweet corn are in dozens of ears per acre. A rating of *very good* means 1,000 to 1,200 dozen; *good* means 800 to 1,000 dozen; and *fair* means 600 to 800 dozen.

The ratings for fresh market tomatoes are in tons per acre. A rating of *very good* means 8.3 to 10 tons; *good* means 6.7 to 8.3 tons; and *fair* means 5.0 to 6.7 tons.

The ratings for apples are in bushels per acre where 45 trees per acre are 15 to 30 years old: A rating of *very good* means 900 or more bushels; *good* means 700 bushels; and *fair* means 500 bushels. Soils which are mostly in valleys are not rated. They are generally not suited to orchards because of poor air drainage.

[6] By ROBERT L. BOND, agronomist, Soil Conservation Service.

Formation, Morphology, and Classification of the Soils

This section discusses the major factors that affect the formation and morphology of the soils of Allegheny County and classifies the soils by higher categories in the national system of soil classification.

Factors of Soil Formation

Soils are formed through the interaction of five major factors. They are climate, plant and animal life, parent material, relief, and time. The relative influence of each factor varies from place to place. Local variations in soils are caused mainly by differences in parent material and in topography and drainage. In places one factor may dominate the formation of a soil and determine most of its properties.

Climate

The climate of Allegheny County is a humid continental type that is marked by extreme seasonal temperature changes. Annual precipitation is about 38 inches. The rainfall is rather uniform during the growing season of April through September, averaging about 20 to 23 inches. Mean annual air temperature is about 50° F. The cool temperature has promoted the accumulation of organic matter in the surface layer of the soils. For more detailed information on climate, see the section "Environmental Factors Affecting Soil Use."

Plant and animal life

All living organisms are important to soil formation. These include vegetation, animals, bacteria, and fungi. Vegetation is mainly responsible for the amount of organic matter and nutrients in the soil and the color of the surface layer. Earthworms, cicadas, and burrowing animals help keep the soil open and porous. Bacteria and fungi decompose the vegetation, releasing nutrients for plant food.

In Allegheny County, the native forests have had more influence on soil formation than any other living organism. Man, however, has greatly influenced the surface layer where he has cleared the forests and plowed the land. He has added fertilizers, mixed some of the soil horizons, and moved soil materials from place to place.

Parent material

Parent material is the unconsolidated mass in which the soil formed. It determines the mineralogical and chemical composition of the soil and, to a large extent, the rate at which the soil-forming processes take place.

TABLE 9.—*Estimated yields of crops under improved management and suitability for special crops*

[Absence of a yield or suitability rating indicates that the soil is not suited or is poorly suited to the specified crop. Soils and land types that are not suitable for farming are not listed in the table]

Soils	Yields per acre					Suitability for—		
	Corn [1]	Oats	Wheat	Alfalfa-grass hay	Bluegrass pasture	Sweet corn	Tomatoes	Apples
	Bu	*Bu*	*Bu*	*Tons*	*Cow-acre-days* [2]			
Allegheny silt loam, coarse subsoil variant, 2 to 8 percent slopes	120	75	45	4.5	160	Very good	Very good	Very good.
Allegheny silt loam, coarse subsoil variant, 8 to 15 percent slopes	110	70	40	4.0	135	Very good	Very good	Very good.
Atkins silt loam	95	60			135	Good		
Brinkerton silt loam, 2 to 8 percent slopes	90	60			115	Fair		
Cavode silt loam, 2 to 8 percent slopes	85	65	35		135	Good	Good	Fair.
Cavode silt loam, 8 to 15 percent slopes	80	60	30		135	Good	Fair	Fair.
Clarksburg silt loam, 3 to 8 percent slopes	100	70	40	3.5	135	Good	Good	
Clarksburg silt loam, 8 to 15 percent slopes	90	65	40	3.5	135	Good	Good	
Clymer silt loam, 3 to 8 percent slopes	120	75	45	4.5	160	Very good	Very good	Very good.
Clymer silt loam, 8 to 15 percent slopes	110	70	40	4.0	135	Very good	Very good	Very good.
Clymer silt loam, 15 to 25 percent slopes	95	60	35	4.0	135			Very good.
Culleoka silt loam, 3 to 8 percent slopes	95	65	40	3.5	135	Good	Good	Good.
Culleoka silt loam, 8 to 15 percent slopes	90	60	35	3.0	115	Fair	Fair	Good.
Culleoka silt loam, 15 to 25 percent slopes	80	55	30	3.0	90			Good.
Culleoka-Weikert shaly silt loams, 3 to 8 percent slopes	60	50	25	2.5	90			Fair.
Culleoka-Weikert shaly silt loams, 8 to 15 percent slopes		45	20	2.0	90			Fair.
Culleoka-Weikert shaly silt loams, 15 to 25 percent slopes					65			
Dormont silt loam, 2 to 8 percent slopes	100	65	40	3.5	135	Good	Good	Good.
Dormont silt loam, 8 to 15 percent slopes	90	60	35	3.5	135	Good	Good	Good.
Dormont silt loam, 15 to 25 percent slopes	80	55	30	3.0	115			Good.
Dormont silt loam, 25 to 35 percent slopes					100			
Ernest silt loam, 2 to 8 percent slopes	100	65	40	3.5	135	Good	Good	
Ernest silt loam, 8 to 15 percent slopes	95	60	35	3.5	135	Good	Good	
Ernest silt loam, 15 to 25 percent slopes	90	55	35	3.0	115			
Ernest-Vandergrift silt loams, 3 to 8 percent slopes	100	65	40	3.5	135	Good	Good	
Ernest-Vandergrift silt loams, 8 to 15 percent slopes	95	60	35	3.5	135	Good	Good	
Ernest-Vandergrift silt loams, 15 to 25 percent slopes	90	55	35	3.0	115			
Gilpin silt loam, 2 to 8 percent slopes	95	65	40	3.5	135	Good	Good	Good.
Gilpin silt loam, 8 to 15 percent slopes	90	60	35	3.5	135	Fair	Fair	Good.
Gilpin silt loam, 15 to 25 percent slopes	85	55	30	3.0	115			Good.
Gilpin-Upshur complex, 3 to 8 percent slopes	95	65	40	3.5	135	Good	Good	Fair.
Gilpin-Upshur complex, 8 to 15 percent slopes	90	60	35	3.5	135	Fair	Fair	Fair.
Gilpin-Upshur complex, 15 to 25 percent slopes					115			
Guernsey silt loam, 2 to 8 percent slopes	100	65	40	3.0	135	Good	Good	Good.
Guernsey silt loam, 8 to 15 percent slopes	90	60	35	3.0	135	Good	Good	Good.
Guernsey silt loam, 15 to 25 percent slopes	80	55	30	2.5	115			Good.
Guernsey-Vandergrift silt loams, 3 to 8 percent slopes	100	65	40	3.0	135	Good	Good	Good.
Guernsey-Vandergrift silt loams, 8 to 15 percent slopes	90	60	35	3.0	135	Good	Good	Good.
Guernsey-Vandergrift silt loams, 15 to 25 percent slopes	80	55	30	2.5	115			Good.
Hazleton loam, 3 to 8 percent slopes	120	75	45	4.5	160	Very good	Very good	Very good.
Hazleton loam, 8 to 15 percent slopes	110	70	40	4.0	135	Very good	Very good	Very good.
Hazleton loam, 15 to 25 percent slopes	95	60	35	4.0	135			Very good.
Huntington silt loam	135	80	50	5.0	160	Very good	Very good	
Library silty clay loam, 3 to 8 percent slopes	95	60	35		135			Fair.
Library silty clay loam, 8 to 15 percent slopes	85	55	30		135			Fair.
Library silty clay loam, 15 to 25 percent slopes	80	50	25		115			Fair.
Lindside silt loam	130	80	45	4.5	160	Very good	Very good	
Newark silt loam	115	70			135	Very good		
Philo silt loam	130	80	45	4.5	160	Very good	Very good	

TABLE 9.—*Estimated yields of crops under improved management and suitability for special crops*—Continued

Soils	Yields per acre					Suitability for—		
	Corn [1]	Oats	Wheat	Alfalfa-grass hay	Bluegrass pasture	Sweet corn	Tomatoes	Apples
	Bu	*Bu*	*Bu*	*Tons*	*Cow-acre-days* [2]			
Rainsboro silt loam, 0 to 3 percent slopes	100	65	40	3.5	135	Good	Good	Good.
Rainsboro silt loam, 3 to 8 percent slopes	95	65	40	3.5	135	Good	Good	Good.
Rainsboro silt loam, 8 to 15 percent slopes	90	60	35	3.0	115	Good	Good	Good.
Rayne silt loam, 2 to 8 percent slopes	110	75	45	4.5	160	Very good	Very good	Very good.
Rayne silt loam, 8 to 15 percent slopes	100	70	40	4.5	160	Very good	Very good	Very good.
Upshur silty clay loam, 3 to 8 percent slopes	95	65	40	4.0	135	Good	Good	Fair.
Upshur silty clay loam, 8 to 15 percent slopes	90	60	35	4.0	135	Fair	Fair	Fair.
Wharton silt loam, 2 to 8 percent slopes	100	65	40	3.5	135	Good	Good	Good.
Wharton silt loam, 8 to 15 percent slopes	90	60	35	3.5	135	Good	Good	Good.
Wharton silt loam, 15 to 25 percent slopes	80	55	30	3.0	135			Good.

[1] The bushels per acre yield can be converted to tons per acre of silage when divided by 5; for example, 120 bushels equals 24 tons of silage.

[2] Cow-acre-days is a term used to express the carrying capacity of pasture. It is the number of animal units carried per acre multiplied by the number of days the pasture is grazed during a single grazing season without injury to the sod. An animal unit is 1,000 pounds live weight, or one cow, steer, horse, or mule, five hogs, or seven sheep. An acre of pasture that provides 30 days of grazing for two cows, for example, has a carrying capacity of 60 cow-acre-days.

In Allegheny County, soils formed in material weathered from sedimentary bedrock, colluvium, terrace deposits, and recent stream alluvium. Extensive areas of the natural soils in the county have been greatly altered or removed by strip mining and industrial and urban development.

Variation in the soil texture is one of the most obvious differences that can be related to differences in bedrock. Cavode, Clymer, Culleoka, Dormont, Gilpin, Guernsey, Hazleton, Library, Rayne, Upshur, Vandergrift, Weikert, and Wharton soils formed in material weathered from sedimentary bedrock. They are the most extensive soils in the county, and they have a wide range of characteristics. Brinkerton, Clarksburg, and Ernest soils formed in colluvium, and they generally are loamy. Allegheny variant and Rainsboro soils formed in terrace deposits. They generally are loamy, and they are commonly underlain by stratified materials including varying amounts of sand and gravel. Atkins, Huntington, Lindside, Newark, and Philo soils are on the stream flood plains. They formed in waterlaid materials called recent alluvium. They are generally loamy and have little horizon development.

Relief

Allegheny County is in the Appalachian Plateaus Province (*12*). The plateau in Allegheny County is dissected by narrow, nearly level stream valleys that have steep to very steep sides. The narrow valleys are often 400 to 500 feet below the elevation of ridgetops. The ridgetops are commonly gently sloping to moderately steep. The steeper soils in the county generally are the shallowest.

The shape of the land surface, commonly called the lay of the land, its slope, and its position in relation to the water table have had great influence on the formation of soils in the county. Soils that formed in convex sloping areas where runoff is moderate to rapid, generally are well drained, have a bright-colored, unmottled subsoil, and in most places are leached to a greater depth than wetter soils in the same general area. In more gently sloping and concave areas where runoff is slower, the soils generally show some evidence of wetness for short periods of time, such as mottling in the subsoil. In level areas or slight depressions where the water table is at or near the surface for long periods, the soils show evidence of wetness to a marked degree. They have strongly mottled or grayish subsoils.

The permeability of the soil material, as well as the length, steepness, and configuration of the slopes, influences the kind of soil that is formed from place to place.

Time

The formation of soils requires time, generally a long time, for change to take place in the parent material.

Soils that formed on flood plains are subject to varying degrees of flooding. They generally receive new sediments with each flooding. These soils have only weak soil structure and weak color differences between horizons. An example is the Lindside soils. Such soils as Wharton soils, which have well developed soil horizons have been forming for longer periods than the Lindside soils.

Morphology of the Soils

This subsection describes briefly horizon nomenclature and the processes of horizon development.

Major soil horizons

The results of the soil-forming factors can be distinguished by the different layers, or soil horizons, in a soil profile. The soil profile extends from the surface of the land downward to materials that are little altered by the soil-forming processes.

Most soils have three major horizons, called the A, B, and C horizons (*10*). These major horizons are sometimes further subdivided, using numbers and let-

ters to indicate changes within one horizon. For example, the B2t horizon represents a B horizon that contains an accumulation of clay.

The A horizon is the surface layer. An A1 horizon is the part of the surface layer that has the largest accumulation of organic matter. The A horizon is also the layer of maximum leaching, or eluviation, of clay and iron. Where considerable leaching has taken place and organic matter has not darkened the soil material, there is an A2 horizon. In most soils in Allegheny County, the A horizon has been plowed or otherwise disturbed and has a designation of Ap, Ap1, or Ap2.

The B horizon underlies the A horizon and is commonly called the subsoil. It is the horizon of maximum accumulation, or illuviation, of clay, iron, aluminum, or other compounds which are leached from the surface layer. In some soils, the B horizon is formed by alteration in place rather than by illuviation. The alteration may be caused by oxidation and reduction of iron or by the weathering of clay minerals. The B horizon commonly has blocky or prismatic structure, and it generally is firmer and lighter colored than the A1 horizon but darker colored than the C horizon. If it contains significant amounts of accumulated clay, it is called an argillic horizon.

The C horizon is below the A or B horizon. It consists of materials that are little altered by the soil-forming processes, but that may be modified by weathering.

Processes of soil horizon differentiation

In Allegheny County several processes are involved in the formation of soil horizons. Among these are the accumulation of organic matter, the leaching of soluble salts, the reduction and transfer of iron, the formation of soil structure, and the formation and translocation of clay minerals. These processes are continually taking place, generally at the same time throughout the profile. Such processes have been going on for thousands of years.

Accumulation and incorporation of organic matter take place as plant residue decomposes. This darkens the surface layer and helps form the A1 horizon. Organic matter, if lost, normally takes a long time to replace.

In order for soils to have distinct subsoil horizons, it is believed that some of the lime and other soluble salts are leached before the translocation of clay minerals. Factors that affect this leaching are the kinds of salts that occur, the depth to which the soil solution percolates, and the texture of the soil profile.

Well drained and moderately well drained soils in Allegheny County commonly have yellowish-brown or brown subsoil horizons. These colors are caused mainly by thin coatings of iron oxides on sand and silt grains. In some soils, for example Upshur soils, the colors are inherited from the reddish materials in which they developed. Weak to moderate development of subangular blocky structure has taken place in the subsoil. The subsoil generally contains more clay than the overlying surface horizons.

A fragipan has developed in the subsoil of some of the moderately well drained, somewhat poorly drained, and poorly drained soils in the county. The Brinkerton, Clarksburg, Ernest, and Rainsboro series are examples. The fragipan is very firm and brittle when moist and is very hard when dry. Because the soil particles are tightly packed, bulk density is high and there is little pore space. Genesis of these horizons is not fully understood, but studies show that swelling and shrinking takes place in alternating wet and dry periods. This may cause packing of soil particles and also the gross polygonal pattern of cracks in the fragipan. Clay, silica, and oxides of aluminum are most frequently the cementing agents that cause brittleness and hardness.

The reduction and transfer of iron, a process called gleying, is associated mainly with the wetter, more poorly drained soils. Moderately well drained to somewhat poorly drained soils have mottles of yellowish brown and reddish brown, which indicate the segregation of iron. In poorly drained soils, such as the Brinkerton and Atkins soils, the subsoil and underlying materials are grayish colored as a result of the reduction and transfer of iron by removal in solution.

Classification of the Soils

Soils are classified so that we can more easily remember their significant characteristics. Classification enables us to assemble knowledge about the soils, to see their relationship to one another and to the whole environment, and to develop principles that help us to understand their behavior and their response to manipulation. First through classification, and then through use of soil maps, we can apply our knowledge of soils to specific fields and other tracts of land.

The narrow categories of classification, such as those used in detailed soil surveys, allow us to organize and apply knowledge about soils in managing farms, fields, and woodland; in developing rural areas; in engineering work; and in many other ways. Soils are placed in broad classes to facilitate study and comparison in large areas such as countries and continents.

The system of soil classification currently used was adopted by the National Cooperative Soil Survey in 1965 (*11*). Because this system is under continual study, readers interested in developments of the current system should refer to the latest literature available (*9*).

The current system of classification has six categories. Beginning with the broadest, these categories are order, suborder, great group, subgroup, family, and series. In this system the criteria used as a basis for classification are soil properties that are observable and measurable. The properties are chosen, however, so that the soils of similar genesis, or mode of origin, are grouped. In table 10, the soil series of Allegheny County are placed in three categories of the current system. Classes of the current system are briefly defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The properties used to differentiate among soil orders are those that tend to give broad climatic groupings of soils. The two exceptions of this are the Entisols and Histosols, which occur in many different climates. Each order is named with a word of three or four syllables ending in *sol* (Ent-i-sol).

SUBORDER. Each order is subdivided into suborders

TABLE 10.—*Classification of the soil series*

Soil series	Family	Subgroup	Order
Allegheny variant	Fine-loamy over sandy or sandy-skeletal, mixed, mesic	Typic Hapludults	Ultisols.
Atkins	Fine-loamy, mixed, acid, mesic	Typic Fluvaquents	Entisols.
Brinkerton	Fine-silty, mixed, mesic	Typic Fragiaqualfs	Alfisols.
Cavode	Clayey, mixed, mesic	Aeric Ochraquults	Ultisols.
Clarksburg	Fine-loamy, mixed, mesic	Typic Fragiudalfs	Alfisols.
Clymer	Fine-loamy, mixed, mesic	Typic Hapludults	Ultisols.
Culleoka	Fine-loamy, mixed, mesic	Ultic Hapludalfs	Alfisols.
Dormont	Fine-loamy, mixed, mesic	Ultic Hapludalfs	Alfisols.
Ernest	Fine-loamy, mixed, mesic	Aquic Fragiudults	Ultisols.
Gilpin	Fine-loamy, mixed, mesic	Typic Hapludults	Ultisols.
Guernsey	Fine, mixed, mesic	Aquic Hapludalfs	Alfisols.
Hazleton	Loamy-skeletal, mixed, mesic	Typic Dystrochrepts	Inceptisols.
Huntington	Fine-silty, mixed, mesic	Fluventic Hapludolls	Mollisols.
Library	Fine, mixed, mesic	Aeric Ochraqualfs	Alfisols.
Lindside	Fine-silty, mixed, mesic	Fluvaquentic Eutrochrepts	Inceptisols.
Newark	Fine-silty, mixed, nonacid, mesic	Aeric Fluvaquents	Entisols.
Philo	Coarse-loamy, mixed, mesic	Fluvaquentic Dystrochrepts	Inceptisols.
Rainsboro	Fine-silty, mixed, mesic	Typic Fragiudalfs	Alfisols.
Rayne	Fine-loamy, mixed, mesic	Typic Hapludults	Ultisols.
Upshur	Fine, mixed, mesic	Typic Hapludalfs	Alfisols.
Vandergrift	Fine, mixed, mesic	Aquic Hapludalfs	Alfisols.
Weikert	Loamy-skeletal, mixed, mesic	Lithic Dystrochrepts	Inceptisols.
Wharton	Clayey, mixed, mesic	Aquic Hapludults	Ultisols.
Strip mines [1]		Typic Udorthents	Entisols.

[1] This land type is too variable to classify at the family level.

that are based primarily on the soil characteristics that seem to produce classes with the greatest genetic similarity. The suborders narrow the broad climatic range permitted in the orders. The soil properties used to separate suborders are mainly those that reflect either the presence or absence of water-logging, or soil differences resulting from the climate or vegetation. The names of suborders have two syllables. The last syllable indicates the order. An example is *Aquent* (*Aqu,* meaning water or wet, and *ent,* for Entisol).

GREAT GROUP. Soil suborders are separated into great groups on the basis of uniformity in the kinds and sequence of major soil horizons and features. The horizons used to make separations are those in which clay, iron, or humus have accumulated; those that have pans that interfere with growth of roots, movement of water, or both; and thick, dark-colored surface horizons. The features used are the self-mulching properties of clay, soil temperature, major differences in chemical composition (mainly calcium, magnesium, sodium, and potassium), dark-red and dark-brown colors associated with basic rocks, and the like. The names of great groups have three or four syllables and are made by adding a prefix to the name of the suborder. An example is Fluvaquents (*Fluv,* meaning stratification with organic carbon that decreases irregularly with depth, *aqu* for wetness or water, and *ent,* from Entisols).

SUBGROUP. Great groups are subdivided into subgroups, one representing the central (typic) segment of the group, and others called intergrades that have properties of the group and also one or more properties of another great group, suborder, or order. Subgroups may also be made in those instances where soil properties intergrade outside of the range of any other great group, suborder, or order. The names of subgroups are derived by placing one or more adjectives before the name of the great group. An example is Typic Fluvaquents (a typical Fluvaquent).

FAMILY. Soil families are separated within a subgroup primarily on the basis of properties important to the growth of plants or the behavior of soils when used for engineering. Among the properties considered are texture, mineralogy, reaction, soil temperature, permeability, thickness of horizons, and consistence. A family name consists of a series of adjectives preceding the subgroup name. The adjectives are the class names for texture, mineralogy, and so on, that are used as family differentiae. An example is the fine-loamy, mixed, acid, mesic family of Typic Fluvaquents. The Atkins series is so classified in table 10.

SERIES. The series is a group of soils that have major horizons which, except for texture of the surface layer, are similar in important characteristics and in arrangement in the profile. It should be emphasized that any one soil series can belong to only one soil family.

Laboratory Soil Characterization [7]

Laboratory soil characterization identifies properties useful in studying soil formation processes, in interpreting limitations for land use, in classifying pedons and series, and in understanding genetic concepts of soils. The factors influencing soil formation may vary independently, and consequently soils may be variable even though their apparent environment is similar. Detailed studies are clarifying these relationships, although there are practical limitations to sampling. They add to the information previously collected, par-

[7] By R. L. CUNNINGHAM, R. P. MATELSKI, G. W. PETERSEN, E. J. CIOLKOSZ, and R. PENNOCK, JR., Department of Agronomy, The Pennsylvania State University.

ticularly in southwestern Pennsylvania where continued characterization studies are in progress.

Ten sites were sampled that represent five important soil series in southwestern Pennsylvania. These soils were derived from shale bedrock that weathered in place. Morphological descriptions given in the descriptions of the soils in this survey explain the differences among the Weikert, Culleoka, Gilpin, Library, and Dormont soils. In order listed, the soils increase progressively in depth and in content of clay and decrease in permeability and in content of shale fragments, except Library soils contain more clay than Dormont soils.

The detailed laboratory data and methodology are published as part of the cumulative soil characterization studies of the Agronomy Department, the Pennsylvania State University (*4*). The following general interpretive discussion is based on that data.

Coarse fragments

Particles that are less than 2 millimeters in diameter are fine earth. Particles that are more than 2 millimeters in diameter are not included in chemical, mineralogical, and some physical analyses. They are called coarse fragments. The fragments between 2 and 76 millimeters in diameter (fig. 20) are flat shale pieces. For each soil tested the content of coarse fragments increases as depth increases; that is, the closer to bedrock, the more coarse fragments are in the soil. Also, the shallower the soil, the more coarse fragments it contains.

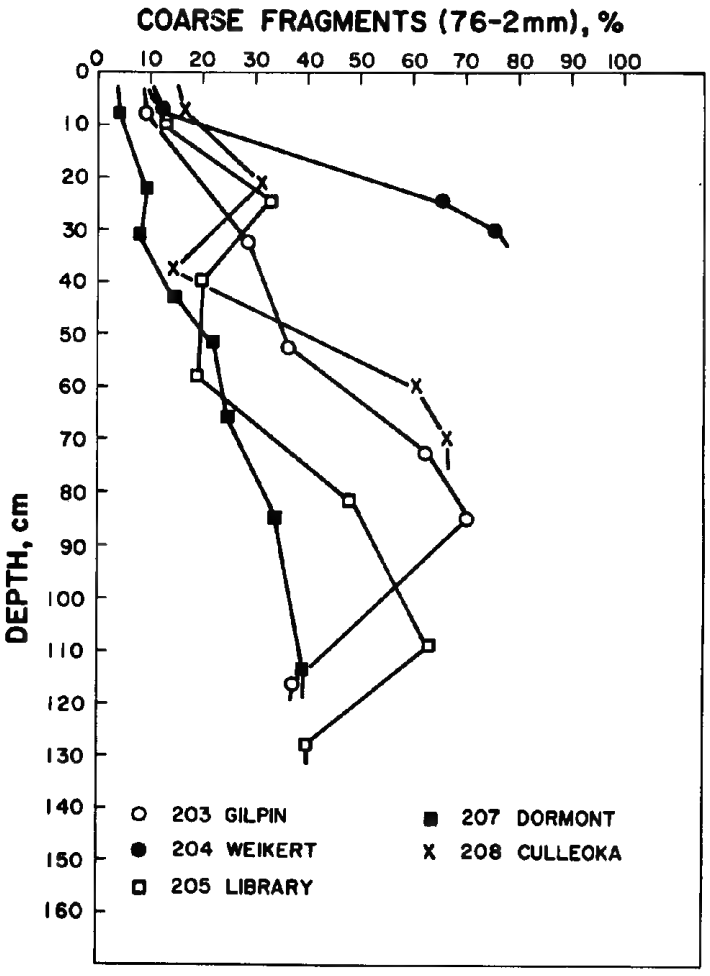


Figure 20.

In pedon 204-Weikert, the high coarse fragment content at a depth of 25 centimeters indicates the proximity of the shale bedrock. Thin-bedded, rather soft shale weathers to many coarse fragments and interstitial fine earth. It is difficult to determine the boundary between C and R horizons, especially if pits are dug with a backhoe.

The surface layer of three of the soils contains about 10 percent shale, in the other two it contains 5 and 15 percent shale. Shale is generally softer than most other types of rock, and occasionally, if the fragments are highly weathered, it absorbs water. In general, however, soils that contain large amounts of fragments are less desirable for most purposes. Large amounts of fragments, such as the 65 percent that occurs below a depth of 50 centimeters in three of the tested profiles, reduce the effectiveness of the fine earth part of the soil. If a horizon is 50 percent fragments and the material less than 2 millimeters in diameter is 20 percent clay, then the total horizon is only 10 percent clay. Analogous calculations can be made for other physical properties and all chemical properties of the fine earth particles.

Because surface fragments dissipate some of the energy of raindrops, soils that have moderate amounts of coarse fragments on the surface tend to resist erosion. Water generally percolates fastest through soil that contains more coarse fragments, if other properties are similar.

Clay content

The amount of clay in a soil indicates its physical and chemical reactive properties. The more clay the soil contains the more plastic it is and the higher the shrink-swell potential and cation exchange capacity. The amount of water that the soil will hold increases as the clay content increases; however, the water available to plants does not necessarily increase.

Clay is a mobile component of soils and often reveals the state or degree of soil development. Some soils contain a relatively low amount of clay in the surface layer, a higher amount between depths of 25 and 75 millimeters, and then less below a depth of 100 centimeters. The clay-enriched zone is called an argillic horizon and is a key feature in the studies of soil formation. For further information refer to the section on the formation and classification of soils in this survey.

Figure 21 illustrates the clay distribution as a function of depth for one profile of each of the five soils sampled. The curve for profile 205—Library shows the most clay at a depth of 50 centimeters. This is an illustration of an argillic horizon formed through leaching processes that move clay from the A to the B horizon. The other profiles, except profile 204—Weikert, also have argillic horizons, but not such distinct ones as in profile 205—Library. The surface horizons contain approximately 20 percent clay, except profile 208—Culleoka, which contains 12 percent clay. In southwestern Pennsylvania, the 15 to 30 percent clay con-

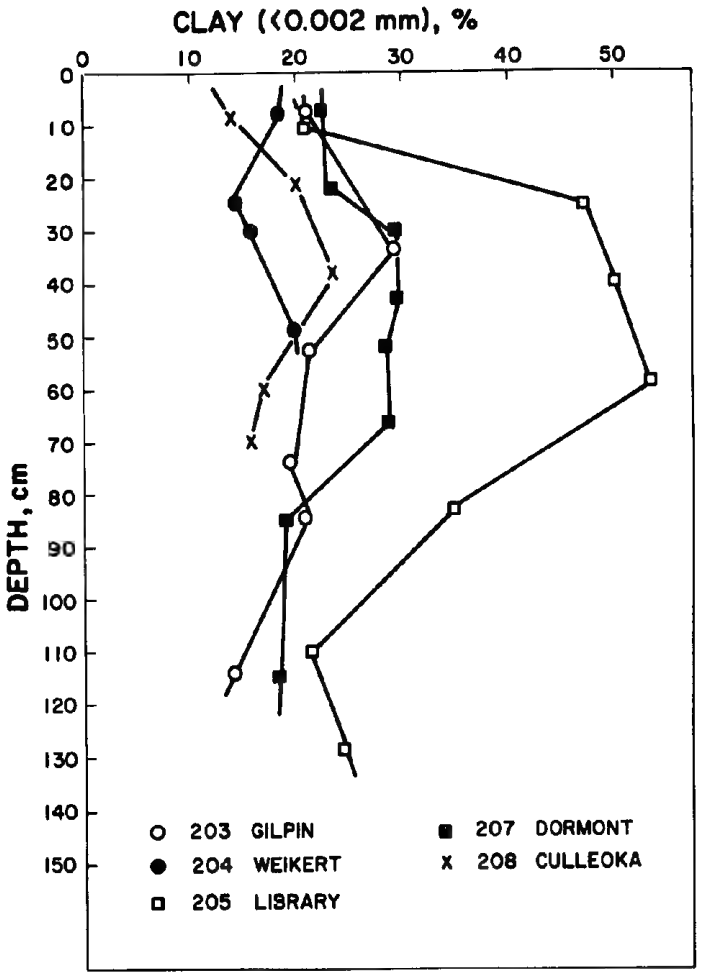


Figure 21.

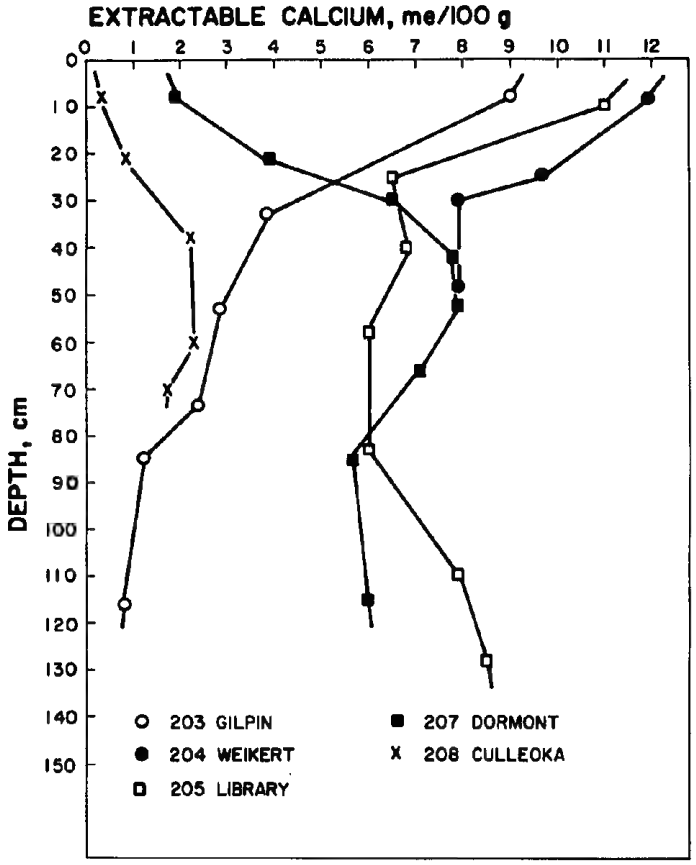


Figure 22.

tent near the contact with bedrock is typical of many soils that are derived from shale.

Nutrients

An indication of the nutrient-holding capacity of soils is the cation exchange capacity of fine earth as measured in the laboratory. Clay is the active mineral soil material. Trends in exchange capacity are shown by the trends in clay percentages. Organic matter also contributes to cation exchange capacity. The highest capacity is in the horizons that contain the most organic matter. Measured in milliequivalents per 100 grams of soil, surface horizons of the analyzed soils have capacities of about 20. Subsoil horizons show decreasing capacities that range from 10 to 15 milliequivalents per 100 grams.

Soils are acid or basic depending upon the cation content of the exchange complex. Where the cation exchange capacity of the soil clays and organic matter is dominated by hydrogen and aluminum ions, the soil is acid and the pH is low. Where the complex is dominated by calcium ions, the soil is basic and the pH is high.

In Allegheny County, most soils are acid. In the county's humid climate, vegetation depletes the soil of soluble calcium ions. Figure 22 illustrates, for five soils discussed, how the amount of extractable calcium changes with depth. The amount of extractable calcium gives an indication of soil chemistry. Three of the soils are higher in calcium in the deep horizons than the other two. This difference is probably caused by differences in inherent calcium in the shale. This difference is not always characteristic of these soils, but it shows the variations that are common. The profiles of Library and Dormont soils show that those soils more frequently formed in highly basic shale. Gilpin soils generally formed in acid shaly material.

An analysis of the five soils also indicates that the surface horizons do not reflect the calcium ion concentration of the subsurface horizons. Agricultural liming increases the pH of the plow layer. Apparently, three of the soils have been limed and the other two have not. The Dormont profile shows a relatively high extractable calcium ion concentration at a depth of 50 centimeters but a low concentration in the surface layer, because extractable calcium ions have been removed by cropping and leaching, and no lime has been applied. The Gilpin profile shows how applications of lime can influence the surface layer.

The pH values are near 4 when extractable calcium is low and near 7 when extractable calcium is high.

Magnesium levels are high in the Library profile. They reach 8 milliequivalents per 100 grams in the subsoil, whereas other soils contain only 1 to 3 milliequivalents of magnesium per 100 grams. Excessive magnesium may decrease the availability of potassium.

The extractable sodium cation is mobile. Because the climate in Allegheny County is humid and leaching is active, there is less than 0.1 milliequivalent per 100 grams of sodium in all horizons analyzed. This sodium level is not detrimental to plant growth. Potassium extracted ranges from 0.2 to 0.7 milliequivalent per 100 grams, and the most is in deep subsoil horizons. The potassium range is favorable to most plant growth.

Clay minerals

Clay identification by x-ray diffractometry shows that in most horizons the clay is about 50 percent illite and 50 percent vermiculite, kaolinite, and an interstratified illite-vermiculite. Generally vermiculite occurs in the soils sampled in Allegheny County, although quantities are not as striking as in some Pennsylvania soils. Although kaolinite is also a stable weathering product of illite clays, it is probably inherited from the parent shale bedrock. Perhaps it is an indicator of weathering that took place before the shale bedrock was deposited.

The slip and slide susceptibility of soils that contain considerable amounts of expandable clays is also being investigated. These soils include Library and Dormont soils, which are unstable for foundations and other engineering uses because changes in volume occur in the soil during wetting and drying. These soils also have low bearing strength and are likely to flow downhill under relatively low pressures when saturated. The studies include three additional soil series of Allegheny County—the Guernsey, Upshur, and Vandergrift series.

The coefficients of linear extensibility (COLE) are being studied for these soils as well as for others in adjacent counties, and several horizons exceed the critical COLE of 0.06. The results of the investigations will be available through the Soil Characterization Laboratory, Department of Agronomy, Pennsylvania State University, University Park, Pa. 16802.

Percolation rates

Percolation testing of Library soils yielded rates of less than 2.5 centimeters (1 inch) per hour. The rates for Culleoka, Dormont, and Gilpin soils ranged from 0.5 to 4.0 centimeters (0.2 to 1.6 inch) per hour, a considerable variation. The rates for Weikert soils were more than 7.5 centimeters (3 inches) per hour, but the test was run in the fractured shale bedrock. Filter fields for septic tank effluent disposal should percolate at a rate of 2.5 to 25 centimeters (1 to 10 inches) per hour. Slow rates cause the filter fields to malfunction, and excessive rates cause ground or surface water contamination.

Environmental Factors Affecting Soil Use

This section discusses natural and cultural factors in Allegheny County that affect the use and management of soils. It describes trends in land use and agriculture; the general history and background of the area; and the physiography, drainage, geology, water supply, and climate of the county.

Allegheny County was established in 1788. Pittsburgh is in the center of the county where the Allegheny and Monongahela Rivers merge to form the Ohio River. It became the county seat in 1791. Strategically located, Pittsburgh became a stopping-off point for settlers traveling into the Ohio and Mississippi Valleys. Water transportation and local coal deposits stimulated the growth of industry, especially the steel industry. The city grew to be the most important municipality in the county. The early growth of other towns in the county was mostly along the nearly level river valleys. As the population grew and as the overland transportation system developed, communities grew and expanded in other parts of the county. According to the 1970 U. S. Census, Allegheny County has a population of 1,605,016, which includes the 520,117 residents of Pittsburgh.

In Allegheny County, the use of land for farming is decreasing. In 1954 the acreage in farms reported by the U.S. Department of Commerce, Bureau of Census, was 109,793 acres, and there were 1,897 farms. In 1959 there were 68,974 acres in farms, and in 1964 there were 55,305 acres in farms. In 1969 there were 42,479 acres in farms, and there were 449 farms.

The Ohio, Allegheny, and Monongahela Rivers are navigable by heavy shipping. Much of the heavy industry along these rivers utilizes barge transportation. Several interconnecting railroad systems provide rail transportation, mostly along the stream valleys.

Parks and recreation land in the county provide more than 23,000 acres for outdoor recreation. The county's nine large parks serve all areas of the county. There are also parks within the city of Pittsburgh.

Physiography, Drainage, and Geology

Allegheny County, located in the Appalachian Plateaus Province, has ridgetops about 1,200 feet above sea level (*12*). The lowest spot, where the Ohio River leaves the county, is about 82 feet above sea level. Narrow, steep-sided valleys dissect the plateau.

The physical limitation of the steep-sided valleys restricts land use and development. Many of the slopes, even within intensely urbanized areas, are still tree-covered open space.

Allegheny County is in the Ohio River drainage basin. The Allegheny River, which enters the county from the northeast, and the Monongahela River, which enters from the southeast, join at Pittsburgh to form the Ohio River and flow out of the county to the west. Most of the land area of the county drains directly into these three rivers through numerous tributary streams. These tributaries include the Youghiogheny River, Turtle Creek, Plum Creek, Pucketa Creek, Bull Creek, Deer Creek, Pine Creek, Sewickley Creek, Montour Run, Chartiers Creek, Saw Mill Run, and Peters Creek. A small area in the northern part of the county and another in the western part drain to other streams, which eventually flow into the Ohio River downstream from Allegheny County.

The rivers and creeks provide a source of water and transportation, which has stimulated urbanization on adjacent flood plains. Protection from flooding on some of the flood plains has been provided, but flooding problems still exist in some areas.

The rocks of Allegheny County are sedimentary in

origin and have horizontal layering (*12*). There is a gentle regional dip to the south.

Sandstone, shale, claystone, siltstone, limestone, dolomite, and coal are the rocks exposed in the county. Conglomerate is also present, but it is very rare. All rocks are of Permian and Pennsylvanian age of the Paleozoic era.

Although coal is only a small percentage of the total exposed rock, economically it is the major mineral resource. There are more than 20 coal seams exposed in the county, but only the Pittsburgh and upper Freeport seams are of major importance. The Pittsburgh coal seam, which is in the southern part of the county, has been mined extensively. Considerable amounts of this coal have been strip mined. The upper Freeport coal is only exposed locally in the Pine Creek, Bull Creek, and Allegheny River Valleys. Nearly everywhere in the county it is below the ground surface. This coal has been deep mined only in the northeastern quarter of the county.

The other types of rock are interstratified hard sandstone and limestone seams interbedded with thick layers of weak shale and claystone. One of these weak seams is the red claystone called the Pittsburgh red beds. Stratigraphically, this red claystone seam is about midway between the two major coal beds. It is exposed on many steep valley slopes in the county.

River terrace deposits of unconsolidated gravel, sand and silt are in Allegheny County. They are in a linear pattern along the Ohio, Allegheny, Monongahela, and Youghiogheny Rivers and some of the larger tributary streams. The oldest of these river terraces were deposited during the time of glacial activities to the north of the county. Remnants of these older terraces are about 200 to 300 feet above the present stream levels.

Recent stratified alluvium is in the low-lying flood plains adjacent to the present streams.

Strip mining of coal has disturbed about 4.1 percent of the land area in the county. Deep mining has resulted in subsidence in some areas. Both types of mining pollute ground and surface water. Some of the terraces and recent alluvial deposits are a source of sand and gravel. The Allegheny River Valley has been the source of most sand and gravel. Cutting and filling in preparation for urban development has triggered landslides in the county. The Pittsburgh red bed formation and the associated Upshur and Vandergrift soils are especially prone to earthflow type landslides.

Water Supply

About 9,500 acres of surface water are in Allegheny County. This surface water is mostly in flowing streams. The Ohio, Allegheny, Monongahela, and Youghiogheny Rivers make up most of the water area. A small part of the surface water is in impoundments behind earth dams. The largest of these impoundments is North Park Lake.

There are many springs in the county, some of which do not flow all year. Urban development and coal mining have caused local disruption and pollution of many springs.

The sandstone and limestone bedrock is a minor source of ground water (*12*). Wells generally yield only enough water for small domestic and farm needs. The major source of ground water is the alluvial deposits, especially in the Allegheny and Ohio River Valleys.

Climate [8]

Allegheny County has a humid continental climate. The main air masses that affect the region originate in the Gulf of Mexico (warm and moist), the western United States (mild and dry), and Canada (cold and dry). Atlantic moisture occasionally moves over the area from the east. Table 11 gives temperature and precipitation data for the county.

[8] By JAMES RAHN, climatologist for Pennsylvania, National Weather Service, U.S. Department of Commerce.

TABLE 11.—*Temperature and precipitation data*

[From records at Greater Pittsburgh International Airport for the period 1953–72]

Month	Temperature				Precipitation					
	Average daily maximum	Average daily minimum	Average extreme maximum	Average extreme minimum	Average monthly total	One year in 10 will have—		Average monthly snowfall	Average number of days with snow cover of—	
						Less than—	More than—			
	°F	°F	°F	°F	In	In	In	In	1 in or more	6 in or more
January	35	19	57	–2	2.5	1.4	3.6	11.0	13	2
February	38	21	60	0	2.5	1.0	4.3	10.6	11	2
March	47	28	71	11	3.5	1.8	5.3	10.4	6	1
April	61	40	81	23	3.4	1.5	5.6	1.6	(1)	(1)
May	71	49	86	33	3.4	1.5	5.6	.3	(1)	
June	79	57	91	44	3.1	1.7	4.8			
July	83	61	92	49	3.9	2.2	5.7			
August	81	59	90	48	3.1	1.4	5.0			
September	75	54	89	38	2.6	1.1	4.4			
October	62	43	80	27	2.4	.6	4.8	.2	(1)	
November	50	34	70	16	2.4	1.3	3.6	4.1	2	(1)
December	38	24	60	5	2.4	1.0	4.2	8.9	10	1
Year	60	41	94	–5	35.0	29.6	40.4	47.1	42	6

[1] Less than one day.

Usually a succession of freeze/thaw periods occur every winter. Cold weather is periodically interrupted by a milder flow of air from the southwest. Normal daytime temperatures range from the low 40's in the south to the mid 30's at the higher elevations in the central and northern parts of the county. The minimum average temperature at night is in the upper teens and 20's. Below freezing temperatures are reported on about 100 days each year in the south and on as many as 125 days in the north. Subzero weather occurs on about 2 to 6 days each winter. Record low temperatures are around −20° F.

Snowfall across the county ranges from approximately 30 inches in southern valley areas to near 50 inches at the higher northern elevations. Extremes have varied from less than 10 inches in a season to more than 80 inches. There is snow cover of 1 inch or more on about 20 days each year in the south and on 45 to 50 days in the north. A 6-inch cover can be expected on 3 to 6 days in an ordinary winter.

Summers are generally warm and humid. Precipitation is mostly showers. Daytime temperatures are generally in the 80's, and overnight temperatures range in the upper 50's to the mid 60's. July is the wettest month of the year. It gets an average of 4 inches of rain. Spotty local showers can produce widely varying amounts of rainfall in any given period. Thunderstorms occur on about 25 days each summer and occasionally are accompanied by strong winds and hail. Ten tornadoes have been reported in Allegheny County since 1854.

Annual precipitation in the county is 36 to 40 inches. Approximately 58 percent of this falls between April and September. Record maximum monthly totals range between 8 and 9 inches. Occasionally, very heavy rains occur in a short period.

Spring and fall have wide ranges in temperature. The growing season averages 180 days in southern Allegheny County and 160 to 170 days in central and northern areas. Some of the colder valleys in the north have a growing season of less than 160 days. In 2 out of 3 years, the growing season can be expected to range within 20 days of the mean. Frost risk data are shown in table 12.

Literature Cited

1. Allan, Philip F., Garland, Lloyd E., and Dugan, R. Franklin. 1963. Rating Northeastern Soils for Their Suitability for Wildlife Habitat. 28th North Am. Wildl. Nat. Resour. Conf. Wildl. Manage. Inst., pp. 247-261, illus.
2. American Association of State Highway [and Transportation] Officials. 1970. Standard Specifications for Highway Materials and Methods of Sampling and Testing. Ed. 10, 2 vol., illus.
3. American Society for Testing Materials. 1974. Standard Method for Classification of Soils for Engineering Purposes. ASTM Stand. D2487. *In* 1974 Annual Book of ASTM Standards, Part 19.
4. Cunningham, R. D., Petersen, G. W. Matelski, R. P., Rawney, R. W., and Ciolkosz, E. J. 1972. Laboratory Characterization Data and Field Descriptions of Selected Pennsylvania soils. Agron. Ser. 25, 804 pp., The Pennsylvania State University.
5. Ferguson, Roland H. 1968. Timber Resources of Pennsylvania. U. S. Forest Serv. Bull. NE-8, 147 pp., illus.
6. McCarthy, Edward Florince. 1933. Yellow-Poplar Characteristics, Growth and Management. U.S. Dep. Agric. Tech. Bull. 356, 58 pp., illus.
7. Research Committee on Coal Mine Spoil Revegetation in Pennsylvania. 1965. A Guide for Revegetation of Bituminous Strip Mine Spoils in Pennsylvania. 46 pp., illus. (Revised in 1971)
8. Schnur, G. Luther. 1937. Yield, Stand, and Volume Tables for Even-Aged Upland Oak Forests. U.S. Dep. Agric. Bull, 560, 88 pp. illus.
9. Simonson, Roy W. 1962. Soil Classification in the United States. Sci. 137: 1027-1034, illus.
10. United States Department of Agriculture. 1951. Soil Survey Manual. U.S. Dep. Agric. Handb. 18, 503 pp., illus. (Supplement replacing pp. 173-188 issued in May 1962.)
11. United States Department of Agriculture. 1960. Soil Classification, A Comprehensive System, 7th Approximation. Soil Conserv. Serv., 265 pp., illus. (Supplements issued in March 1967, September 1968, and April 1969).
12. Wagner, Walter R. and Others. 1970. Geology of the Pittsburgh Area. Pa. Geol. Surv., 4th Ser. Gen. Geol. Rep. G-59. 145 pp., illus.

Glossary

Alluvium. Soil material, such as sand, silt, or clay, that has been deposited on land by streams.

Available water capacity (also termed **available moisture capacity**). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. In this soil survey, the available

TABLE 12.—*Probabilities of last freezing temperatures in spring and first in fall*

[From records at Greater Pittsburgh International Airport]

Probability	Dates for given probability and temperatures				
	16° F or lower	20° F or lower	24° F or lower	28° F or lower	32° F or lower
Spring:					
1 year in 10 later than	March 30	April 6	April 18	May 3	May 16
2 years in 10 later than	March 25	April 1	April 14	April 28	May 10
5 years in 10 later than	March 16	March 23	April 5	April 18	April 29
Fall:					
1 year in 10 earlier than	November 12	November 11	October 27	October 17	September 30
2 years in 10 earlier than	November 17	November 16	November 1	October 22	October 5
5 years in 10 earlier than	November 27	November 25	November 11	November 1	October 15

water capacity given applies to a maximum depth of 60 inches. The terms used to describe available water capacity in this survey are:

High	more than 7.5 inches
Moderate	5.0 to 7.5 inches
Low	3.0 to 5.0 inches
Very low	less than 3.0 inches

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface. In Allegheny County, the bedrock is fractured sedimentary rock that is rippable.

Calcareous soil. A soil containing enough calcium carbonate (often with magnesium carbonate) to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid.

Channery soil. A soil that contains thin, flat fragments of sandstone, limestone, or schist, as much as 6 inches in length along the longer axis. A single piece is called a fragment.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of clay on the surface of a soil aggregate. Synonyms: clay coat, clay skin.

Colluvium. Soil material, rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material, and tends to stretch somewhat and pull apart, rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard and brittle; little affected by moistening.

Depth, soil. In this soil survey, the terms used to describe soil depth are:

Deep	more than 40 inches
Moderately deep	20 to 40 inches
Shallow	10 to 20 inches
Very Shallow	less than 10 inches

Diversion, or diversion terrace. A ridge of earth, generally a terrace, that is built to divert runoff from its natural course and, thus, to protect areas downslope from the effects of such runoff.

Drainage class (natural). Refers to the conditions of frequency and duration of periods of saturation or partial saturation that existed during the development of the soil, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven different classes of natural soil drainage are recognized.

Excessively drained soils are commonly very porous and rapidly permeable and have a low available water capacity.

Somewhat excessively drained soils are also very permeable and free from mottling throughout their profile.

Well-drained soils are nearly free from mottling and are commonly of intermediate texture.

Moderately well drained soils commonly have a slowly permeable layer in or immediately beneath the solum. They have uniform color in the A and upper B horizons and mottling in the lower B and C horizons.

Somewhat poorly drained soils are wet for significant periods but not all the time, and some soils commonly have mottling at a depth below 6 to 16 inches.

Poorly drained soils are wet for long periods and are light gray and generally mottled from the surface downward, although mottling may be absent or nearly so in some soils.

Very poorly drained soils are wet nearly all the time. They have a dark-gray or black surface layer and are gray or light gray, with or without mottling, in the deeper parts of the profile.

Flood plain. Nearly level land, consisting of stream sediments, that borders a stream and is subject to flooding unless protected artificially.

Gravel. Rounded or angular rock fragments that are not prominently flattened and are as much as 3 inches in diameter.

High wall. The unexcavated face of exposed overburden and coal or ore in an open cast mine, or the face or bank on the uphill side of a contour strip mine excavation.

Horizon, soil. A layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil-forming processes. These are the major horizons:

O horizon.— The layer of organic matter on the surface of a mineral soil. This layer consists of decaying plant residues.

A horizon.—The mineral horizon at the surface or just below an O horizon. This horizon is the one in which living organisms are most active and therefore is marked by the accumulation of humus. The horizon may have lost one or more of soluble salts, clay, and sesquioxides (iron and aluminum oxides).

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or some combination of these; (2) by prismatic or blocky structure; (3) by redder or stronger colors than the A horizon; or (4) by some combination of these. Combined A and B horizons are usually called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The weathered rock material immediately beneath the solum. In most soils this material is presumed to be like that from which the overlying horizons were formed. If the material is known to be different from that in the solum, a Roman numeral precedes the letter C.

R layer.— Consolidated rock beneath the soil. The rock usually underlies a C horizon but may be immediately beneath an A or B horizon.

Landslide. The downward slipping of a mass of soil, or of soil and underlying material, usually with some degree of backward rotation. Such landslides commonly have an uneven, cracked, convex-concave section which gives the appearance of steps or small benches on a slope.

Mine wash. Accumulations of sandy, silty, or clayey material recently eroded in mining operations. Mine wash may clog stream channels and damage land on which it is deposited.

Mottling, soil. Irregularly marked with spots of different colors that vary in number and size. Mottling in soils usually indicates poor aeration and lack of drainage. Descriptive terms are as follows: abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent.* The size measurements are these: *fine,* less than 5 millimeters (about 0.2 inch) in diameter along the greatest dimension; *medium,* ranging from 5 millimeters to 15 millimeters (about 0.2 to 0.6 inch) in diameter along the greatest dimension; and *coarse,* more than 15 millimeters (about 0.6 inch) in diameter along the greatest dimension.

Permeability. The quality that enables the soil to transmit water or air. Terms used to describe permeability in this soil survey are:

	Inches per hour
Slow	Less than 0.2
Moderately slow	0.2 to 0.6
Moderate	0.6 to 2.0
Moderately rapid	2.0 to 6.0
Rapid	more than 6.0

Profile, soil. A vertical section of the soil through all its horizons and extending into the parent material.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is precisely neutral in reaction because it is neither acid nor alkaline. An acid, or "sour," soil is one that gives an acid reaction; an alkaline soil is one that is alkaline in reaction. In words, the degrees of acidity or alkalinity are expressed thus:

	pH		*pH*
Extremely acid	Below 4.5	Neutral	6.6 to 7.3
Very strongly acid	4.5 to 5.0	Mildly alkaline	7.4 to 7.8
Strongly acid	5.1 to 5.5	Moderately alkaline	7.9 to 8.4
Medium acid	5.6 to 6.0	Strongly alkaline	8.5 to 9.0
Slightly acid	6.1 to 6.5	Very strongly alkaline	9.1 and higher

Red dog. Material of a reddish color resulting from the combustion of shale and other mine waste in dumps on the land surface.

Sand. Individual rock or mineral fragments in a soil that range in diameter from 0.05 to 2.0 millimeters. Most sand grains consist of quartz, but they may be of any mineral composition. The textural class name of any soil that contains 85 percent or more sand and not more than 10 percent clay.

Sedimentary rock. Rock composed of particles deposited from suspension in water. The chief sedimentary rocks are conglomerate, from gravel; sandstone, from sand; shale, from clay; and limestone, from soft masses of calcium carbonate. There are many intermediate types.

Silt. Individual mineral particles in a soil that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). Soil of the silt textural class is 80 percent or more silt and less than 12 percent clay.

Soil. A natural, three-dimensional body on the earth's surface that supports plants and that has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Solum. The upper part of a soil profile, above the parent material, in which the processes of soil formation are active. The solum in mature soil includes the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristics of the soil are largely confined to the solum.

Structure, soil. The arrangement of primary soil particles into compound particles or clusters that are separated from adjoining aggregates and have properties unlike those of an equal mass of unaggregated primary soil particles. The principal forms of soil structure are— *platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal,) *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular. Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles) adhering together without any regular cleavage, as in many claypans and hardpans.

Subsidence (geologic). A local mass movement that involves principally the gradual settling or sinking of the earth's surface. In Allegheny County, subsidence is a result of deep coal mining operations.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. Technically, the part of the soil below the solum.

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, about 5 to 8 inches in thickness. The plowed layer.

Terrace (geological). An old alluvial plain, ordinarily flat or undulating, bordering a river, lake, or the sea. Stream terraces are frequently called second bottoms, as contrasted to flood plains, and are seldom subject to overflow. Marine terraces were deposited by the sea and are generally wide.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy, sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay.* The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Upland (geologic). Land consisting of material unworked by water in recent geologic time and lying, in general, at a higher elevation than the alluvial plain or stream terrace. Land above the lowlands along rivers.

Water table. The highest part of the soil or underlying rock material that is wholly saturated with water. In some places an upper, or perched, water table may be separated from a lower one by a dry zone.

GUIDE TO MAPPING UNITS

For a full description of a mapping unit, read both the description of the mapping unit and the description of the soil series to which the mapping unit belongs. The system of capability grouping is explained in the section beginning on page 81.

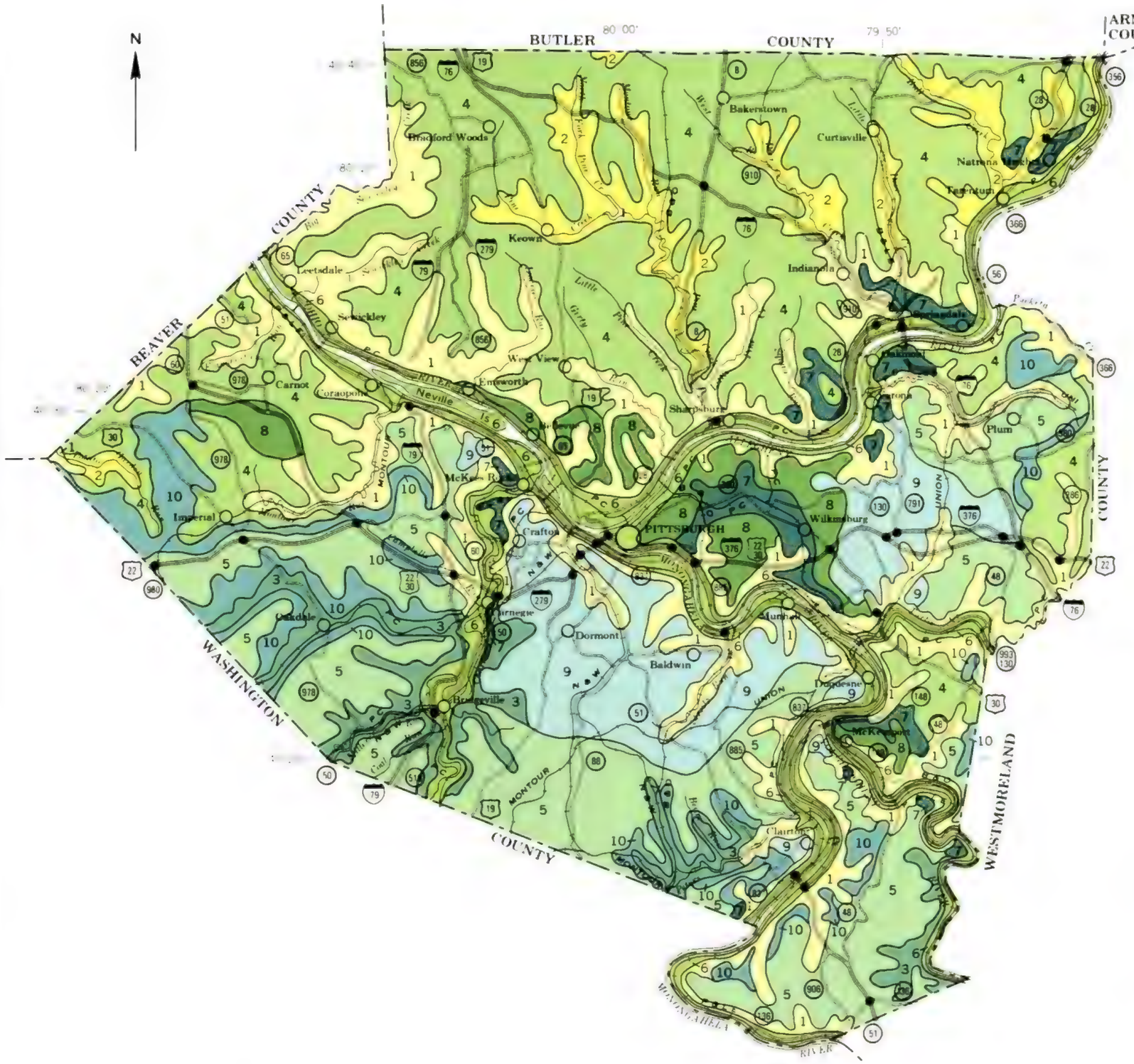
GUIDE TO MAPPING UNITS--Continued

☆U.S. GOVERNMENT PRINTING OFFICE : 1981—214 -521/1027

NRCS Accessibility Statement

This document is not accessible by screen-reader software. The Natural Resources Conservation Service (NRCS) is committed to making its information accessible to all of its customers and employees. If you are experiencing accessibility issues and need assistance, please contact our Helpdesk by phone at 1-800-457-3642 or by e-mail at ServiceDesk-FTC@ftc.usda.gov. For assistance with publications that include maps, graphs, or similar forms of information, you may also wish to contact our State or local office. You can locate the correct office and phone number at http://offices.sc.egov.usda.gov/locator/app.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.



U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

PENNSYLVANIA STATE UNIVERSITY, COLLEGE OF AGRICULTURE
PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL RESOURCES
STATE CONSERVATION COMMISSION

GENERAL SOIL MAP

ALLEGHENY COUNTY, PENNSYLVANIA

Scale 1:253,440
1 0 1 2 3 4 Miles

SOIL ASSOCIATIONS

AREAS DOMINANTLY UNALTERED BY URBAN DEVELOPMENT AND STRIP MINES

1 — Gilpin-Upshur-Atkins association: Moderately deep and deep, well drained soils underlain by red and gray shale on uplands and deep, poorly drained soils on flood plains

2 — Gilpin-Weikert-Atkins association: Shallow and moderately deep, well drained soils underlain by gray shale on uplands and deep, poorly drained soils on flood plains

3 — Culleoka-Weikert-Newark association: Shallow and moderately deep, well drained soils underlain by shale and limestone on uplands and deep, somewhat poorly drained and poorly drained soils on flood plains

4 — Gilpin-Wharton-Upshur association: Moderately deep and deep, well drained and moderately well drained soils underlain by red and gray shale on uplands

5 — Dormont-Guernsey-Culleoka association: Moderately deep and deep, well drained and moderately well drained soils underlain by shale and limestone on uplands

AREAS DOMINANTLY ALTERED BY URBAN DEVELOPMENT AND STRIP MINES

6 — Urban land-Philo-Rainsboro association: Deep, moderately well drained soils and Urban land on flood plains and terraces

7 — Urban land-Rainsboro-Allegheny variant association: Deep, well drained and moderately well drained soils and Urban land on terraces

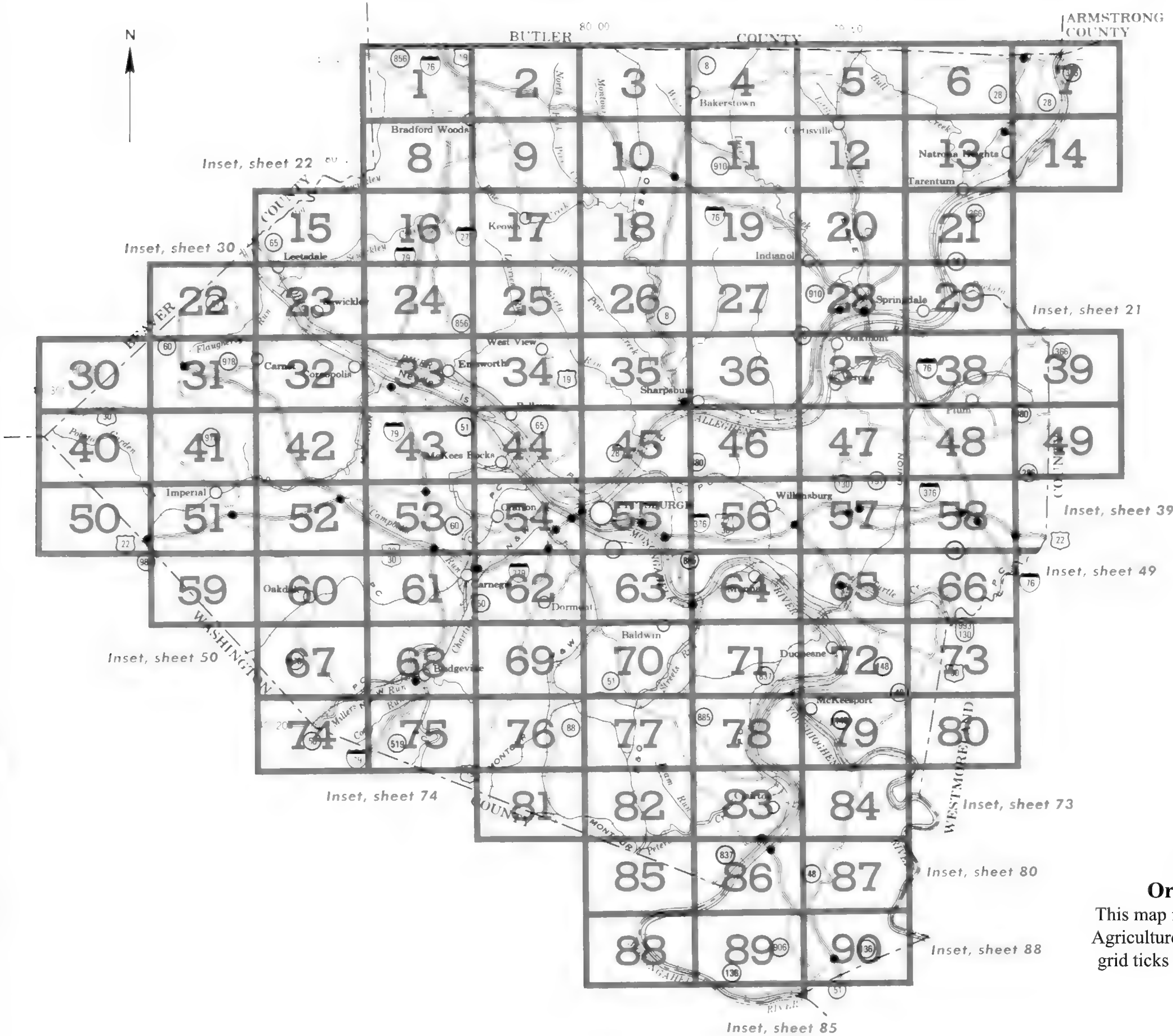
8 — Urban land-Wharton-Gilpin association: Moderately deep and deep, well drained and moderately well drained soils and Urban land underlain by gray shale on uplands

9 — Urban land-Dormont-Culleoka association: Moderately deep and deep, well drained and moderately well drained soils and Urban land underlain by shale and limestone on uplands

10 — Strip mines-Guernsey-Dormont association: Deep, moderately well drained soils and Strip mines underlain by shale and limestone on uplands

Compiled 1976

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.



INDEX TO MAP SHEETS

ALLEGHENY COUNTY, PENNSYLVANIA

Scale 1:253,440

Original text from each individual map sheet read:

This map is compiled on 1973 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SOIL LEGEND

The first letter, always a capital, is the initial letter of the soil name. The second letter is a capital if the mapping unit is broadly defined; otherwise, it is a small letter. The third letter, always a capital, A, B, C, D, E, or F, shows the slope. Most symbols without a slope letter are those of nearly level soils, but some are for miscellaneous land types that have a fair to considerable range of slope.

SYMBOL	NAME
AgB	Allegheny silt loam, coarse subsoil variant, 2 to 8 percent slopes
AgC	Allegheny silt loam, coarse subsoil variant 8 to 15 percent slopes
At	Atkins silt loam
BrB	Brinkerton silt loam, 2 to 8 percent slopes
CaB	Cavode silt loam, 2 to 8 percent slopes
CaC	Cavode silt loam, 8 to 15 percent slopes
CkB	Clarksburg silt loam, 3 to 8 percent slopes
CkC	Clarksburg silt loam, 8 to 15 percent slopes
CmB	Clymer silt loam, 3 to 8 percent slopes
CmC	Clymer silt loam, 8 to 15 percent slopes
CmD	Clymer silt loam, 15 to 25 percent slopes
CuB	Culleoka silt loam, 3 to 8 percent slopes
CuC	Culleoka silt loam, 8 to 15 percent slopes
CuD	Culleoka silt loam, 15 to 25 percent slopes
CwB	Culleoka Weikert shaly silt loams, 3 to 8 percent slopes
CwC	Culleoka Weikert shaly silt loams, 8 to 15 percent slopes
CwD	Culleoka Weikert shaly silt loams, 15 to 25 percent slopes
DoB	Dormont silt loam, 2 to 8 percent slopes
DoC	Dormont silt loam, 8 to 15 percent slopes
DoD	Dormont silt loam, 15 to 25 percent slopes
DoE	Dormont silt loam, 25 to 35 percent slopes
Du	Dumps, coal wastes
Dw	Dumps, industrial wastes
ErB	Ernest silt loam, 2 to 8 percent slopes
ErC	Ernest silt loam, 8 to 15 percent slopes
ErD	Ernest silt loam, 15 to 25 percent slopes
EvB	Ernest Vandergrift silt loams, 3 to 8 percent slopes
EvC	Ernest Vandergrift silt loams, 8 to 15 percent slopes
EvD	Ernest-Vandergrift silt loams, 15 to 25 percent slopes
GlB	Gilpin silt loam, 2 to 8 percent slopes
GlC	Gilpin silt loam, 8 to 15 percent slopes
GlD	Gilpin silt loam, 15 to 25 percent slopes
GpB	Gilpin-Upshur complex, 3 to 8 percent slopes
GpC	Gilpin-Upshur complex, 8 to 15 percent slopes
GpD	Gilpin-Upshur complex, 15 to 25 percent slopes
GQF1	Gilpin-Upshur complex, very steep
GrE	Gilpin-Vandergrift silt loams, slumped, 15 to 35 percent slopes
GSF1	Gilpin, Weikert, and Culleoka shaly silt loams, very steep
GuB	Guernsey silt loam, 2 to 8 percent slopes
GuC	Guernsey silt loam, 8 to 15 percent slopes
GuD	Guernsey silt loam, 15 to 25 percent slopes
GvB	Guernsey-Vandergrift silt loams, 3 to 8 percent slopes
GvC	Guernsey-Vandergrift silt loams, 8 to 15 percent slopes
GvD	Guernsey-Vandergrift silt loams, 15 to 25 percent slopes
Gx	Gullied land
HaB	Hazleton loam, 3 to 8 percent slopes
HaC	Hazleton loam, 8 to 15 percent slopes
HaD	Hazleton loam, 15 to 25 percent slopes
HTE1	Hazleton loam, steep
Hu	Huntington silt loam
LbB	Library silty clay loam, 3 to 8 percent slopes
LbC	Library silty clay loam, 8 to 15 percent slopes
LbD	Library silty clay loam, 15 to 25 percent slopes
Ln	Lindside silt loam
Ne	Newark silt loam
Ph	Philo silt loam
RaA	Rainsboro silt loam, 0 to 3 percent slopes
RaB	Rainsboro silt loam, 3 to 8 percent slopes
RaC	Rainsboro silt loam, 8 to 15 percent slopes
RyB	Rayne silt loam, 2 to 8 percent slopes
RyC	Rayne silt loam, 8 to 15 percent slopes
SmB	Strip mines, 0 to 8 percent slopes
SmD	Strip mines, 8 to 25 percent slopes
SmF	Strip mines, 25 to 75 percent slopes
UaB	Upshur silty clay loam, 3 to 8 percent slopes
UaC	Upshur silty clay loam, 8 to 15 percent slopes
UB1	Urban land
UCB1	Urban land Culleoka complex, gently sloping
UCD1	Urban land Culleoka complex, moderately steep
UCE1	Urban land Culleoka complex, steep
UGB1	Urban land Guernsey complex, gently sloping
UGD1	Urban land Guernsey complex, moderately steep
URB1	Urban land Rainsboro complex, gently sloping
URC1	Urban land Rainsboro complex, sloping
UWB1	Urban land Wharton complex, gently sloping
UWD1	Urban land Wharton complex, moderately steep
WEF1	Weikert Rock outcrop complex, very steep
WhB	Wharton silt loam, 2 to 8 percent slopes
WhC	Wharton silt loam, 8 to 15 percent slopes
WhD	Wharton silt loam, 15 to 25 percent slopes

1 The composition of these units is more variable than that of the others in the survey area but has been controlled well enough to be interpreted for the expected use of the soils.

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES
- National, state or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park, and large airport)
- Land grant
- Limit of soil survey (label)
- Field sheet matchline & neatline

AD HOC BOUNDARY (label)
- Small airport, airfield, park, oil field, cemetery, or flood pool (Davis Airstrip, FLOOD POOL LINE)

STATE COORDINATE TICK

LAND DIVISION CORNERS (sections and land grants)

ROADS
- Divided (median shown if scale permits)
- Other roads
- Trail

ROAD EMBLEMS & DESIGNATIONS
- Interstate (79)
- Federal (410)
- State (52)
- County, farm or ranch (378)

RAILROAD

POWER TRANSMISSION LINE (normally not shown)

PIPELINE (normally not shown)

FENCE (normally not shown)

LEVEES
- Without road
- With road
- With railroad

DAMS
- Large (to scale)
- Medium or small (water)

PITS
- Gravel pit
- Mine or quarry

MISCELLANEOUS CULTURAL FEATURES
- Farmstead, house (omit in urban areas)
- Church
- School
- Indian mound (label) (Indian Mound)
- Located object (label) (Tower)
- Tank (label) (GAS)
- Wells, oil or gas
- Windmill
- Kitchen midden

WATER FEATURES

DRAINAGE
- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end
- Canals or ditches
  - Double-line (label) (CANAL)
  - Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS
- Perennial (water)
- Intermittent (land)

MISCELLANEOUS WATER FEATURES
- Marsh or swamp
- Spring
- Well, artesian
- Well irrigation
- Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS (CeA, FoB2)

ESCARPMENTS
- Bedrock (points down slope)
- Other than bedrock (points down slope)

SHORT STEEP SLOPE

GULLY

DEPRESSION OR SINK

SOIL SAMPLE SITE (normally not shown) (S)

MISCELLANEOUS
- Blowout
- Clay spot
- Gravelly spot
- Gumbo, slick or scabby spot (sodic)
- Dumps and other similar non soil areas
- Prominent hill or peak
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy Spot
- Severely eroded spot
- Slide or slip (tips point upslope)
- Stony spot, very stony spot
- Spot of mine wash, less than 4 acres

ALLEGHENY COUNTY, PENNSYLVANIA — SHEET NUMBER 1

1 335 000 FEET

BUTLER COUNTY

BEAVER COUNTY

(Joins sheet 2)

(Joins Sheet 8)

Warrendale

Bradford Woods

N

1 Mile

5 000 Feet

Scale 1:15 840

ALLEGHENY COUNTY, PENNSYLVANIA — SHEET NUMBER 2

2

N

1 Mile

5 000 Feet

Scale 1:15 840

1 320 000 FEET

1 485 000 FEET

1 355 000 FEET

BUTLER COUNTY

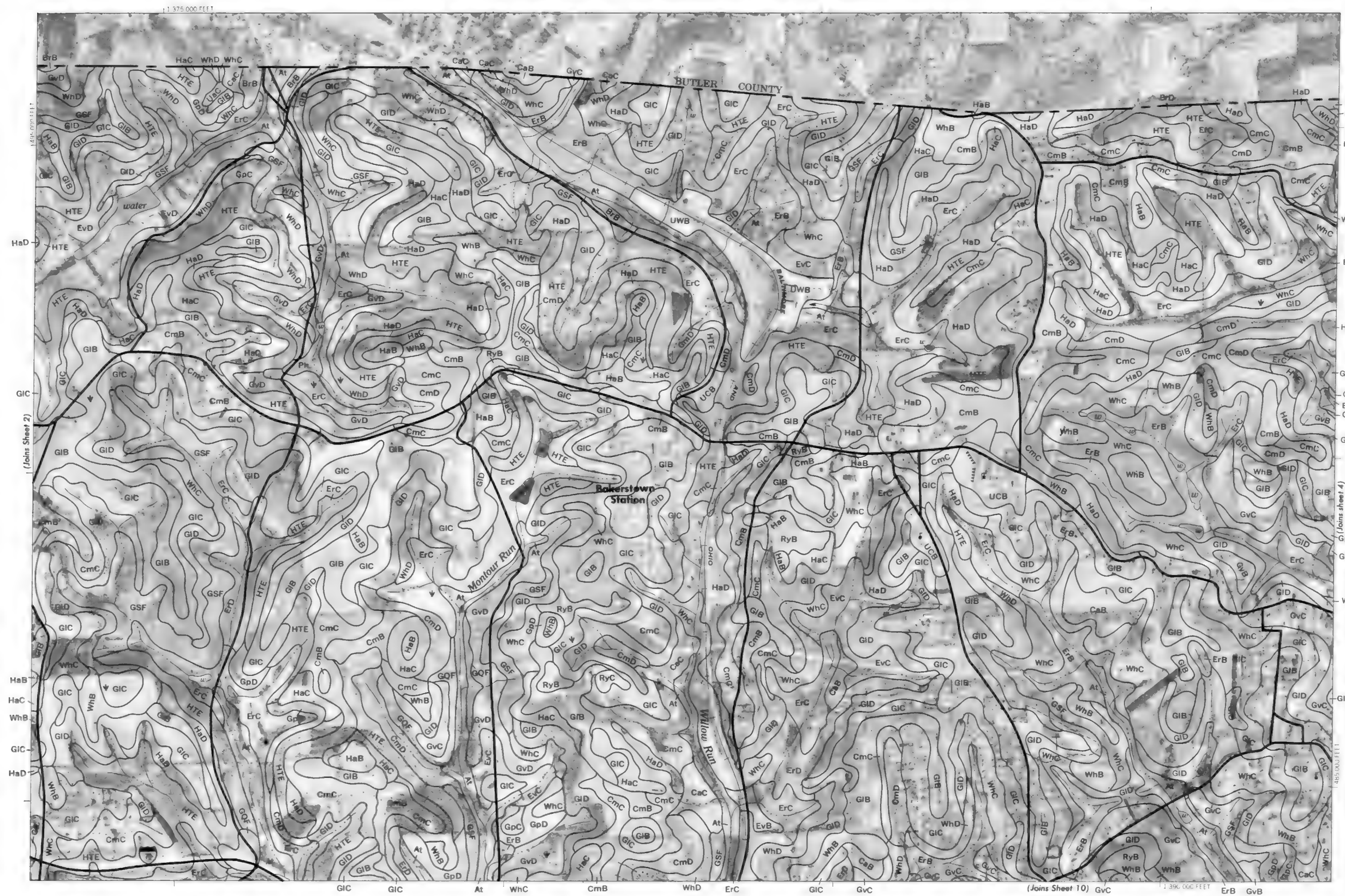
Warrendale

Brush Creek

(Joins Sheet 1)

(Joins sheet 3)

(Joins Sheet 9)


1 375 000 FEET
BUTLER COUNTY
Baker stown Station
Montour Run
Willow Run
OHIO
BALTIMORE
UWB
UCB
water
(Joins Sheet 2)
(Joins sheet 4)
(Joins Sheet 10)
1 396 000 FEET
3
N
1 Mile
5 000 Feet
Scale 1:15 840
0
1/4
1/2
3/4
1
1 000
2 000
3 000
4 000
5 000

ALLEGHENY COUNTY, PENNSYLVANIA — SHEET NUMBER 4

ALLEGHENY COUNTY, PENNSYLVANIA — SHEET NUMBER 5

5

N

1 415 000 FEET

485 000 FEET

BUTLER COUNTY

CULMERVILLE AIRPORT

Culmerville

Blanchard

Curtisville

Millerstown

Bull Creek

(Joins Sheet 4)

(Joins Sheet 6)

(Joins Sheet 12)

1 430 000 FEET

1 Mile

5 000 Feet

Scale 1:15 840

6

N

1 Mile

5 000 Feet

Scale 1:15 840

1 000 0 0 1 000 2 000 3 000 4 000 5 000

1 450 000 FEET

495 000 FEET

BUTLER COUNTY

Millerstown

Bull Creek

Little Bull Creek

UCD

UWB

(Joins Sheet 5)

(Joins sheet 7)

(Joins sheet 13)

1 435 000 FEET

1 455 000 FEET
4 495 000 FEET
BUTLER COUNTY
ALLEGHENY
WESTMORELAND COUNTY
RIVER
CONRAIL
Sligo
(Joins sheet 6)
(Joins sheet 14)
1 470 000 FEET
1 485 000 FEET
7
N
1 Mile
5 000 Feet
Scale 1:15 840

8

N

1 Mile

5 000 Feet

Scale 1:15 840

1 0 1 000 2 000 3 000 4 000 5 000

(Joins sheet 7)

(Joins inset, sheet 22)

(Joins sheet 16)

(Joins Sheet 9)

BEAVER COUNTY

Big Sewickley Creek

Big Sewickley Creek

Big Sewickley Creek

East Branch

Creek

water

GID GSF GID GIB

9

N

1 Mile

5 000 Feet

Scale 1:15 840

1 355 000 FEET

480 000 FEET

1 475 000 FEET

1 370 000 FEET

(Joins Sheet 2)

(Joins sheet 10)

(Joins Sheet 8)

(Joins Sheet 17)

Wexford

Pine Creek

North Fork

water

10

N

1 Mile

5 000 Feet

Scale 1:15 840

(Joins Sheet 3)

(Joins sheet 9)

(Joins Sheet 18)

(Joins Sheet 11)

Gibsonia

Hardy

North Park Lake

Montour Run

Willow Run

INTERCHANGE NO 4

1 390 000 FEET

1 380 000 FEET

1 370 000 FEET

480 000 FEET

470 000 FEET

(Joins Sheet 4)

(Joins sheet 12)

(Joins Sheet 10)

(Joins Sheet 19)

Deer Creek

LAKE ERIE

BESSEMER AND LAKE ERIE

Fairfield

Allegheny Acres

1 395 000 FEET

1 480 000 FEET

1 470 000 FEET

1 410 000 FEET

11

N

1 Mile

5 000 Feet

Scale 1:15 840

0 ¼ ½ ¾ 1

1 000 2 000 3 000 4 000 5 000

12

N

1 Mile

5 000 Feet

Scale 1:15 840

1 4 5 000 FEET

1 4 3 0 3 0 0 FEET

(Joins Sheet 5)

(Joins Sheet 11)

(Joins sheet 20)

(Joins sheet 13)

Curtisville

Benjamin

Megill Heights

Russellton

COUNTY REGIONAL PARK

REMICH AIRPORT

UNION BESSEMER AND LAKE ERIE

Little Deer Creek

UNION BESSEMER AND LAKE ERIE

water

GIB GID GIC GSF WhB WhC WhD GpC GpD GpB GvB GvC GvD GQF GOF UcB UcC UcD UcE UaB UaC UWB ErB ErC ErD GbF CaB CaC HaC HaD HaE SmD SmF EvD RyB RyC At Du Ph

13

N

(Joins Sheet 6)

(Joins Sheet 12)

(Joins Sheet 14)

(Joins Sheet 21)

1 485 000 FEET

1 450 000 FEET

480 000 FEET

470 000 FEET

Scale 1:15 840

1 Mile

5 000 Feet

Bull Creek

Little Bull Creek

Allegheny River

Broadview

Compton

Natrona Heights

Natrona

Pleasantville

BRACKENRIDGE

CONRAIL

14

N

1 Mile 5 000 Feet

Scale 1:15 840

1 470 000 FEET

480 000 FEET

(Joins sheet 7)

(Joins sheet 13)

NATRONA HEIGHTS

ALLEGHENY RIVER

ALLEGHENY COUNTY

WESTMORELAND COUNTY

CONRAIL

LOCK AND DAM NO 4

Natrona

1 470 000 FEET

1 455 000 FEET

N

1 315 000 FEET

470 000 FEET

(Joins inset, sheet 22)

(Joins inset, sheet 30)

(Joins sheet 16)

(Joins Sheet 23)

1 360 000 FEET

BEAVER COUNTY

Creek

Belle Acres

Fairoaks

Leetsdale

Ohio River

Sewickley

Little Sewickley Creek

1 Mile

5 000 Feet

Scale 1:15 840

0 1/4 1/2 3/4 1

1 000 2 000 3 000 4 000 5 000

16

N

1 Mile

5 000 Feet

Scale 1:15 840

0 1/4 1/2 3/4 1

1 000 2 000 3 000 4 000 5 000

(Joins Sheet 8)

(Joins Sheet 15)

(Joins Sheet 17)

(Joins sheet 24)

11 350 000 FEET

11 335 000 FEET

460 000 FEET

400 000 FEET

Little Sewickley Creek

Killbuck Run

Dust City

Bayne

GQF GIC GIB GID GSF GpD GpC GpB Ph At UaB ErB ErC ErE EvD EvC EvB GrE GvC GvB WhB WhC WhD CaB CaC CaD CmC CmD CuC CuD DoB DoC GrB HaD RyB RyC UCB UCE BrB

79 856


1 355 000 FEET
1 475 000 FEET
(Joins Sheet 9)
(Joins sheet 16)
(Joins sheet 18)
(Joins Sheet 25)
Pine Creek
Ingomar
Lowries Run
Koown
UCB
GQF
GSF
GID
GIC
GIB
WhB
WhC
WhD
ErB
ErC
ErD
CmB
CmC
CmD
GpB
GpC
GpD
GvB
GvC
GvD
At
RaA
RaB
HTE
UCD
URB
Ph
17
N
1 Mile
5 000 Feet
Scale 1:15 840
0
¼
½
¾
1
1 000
2 000
3 000
4 000
5 000

N

1 Mile

5 000 Feet

Scale 1:15 840

(Joins Sheet 10)

(Joins Sheet 17)

(Joins sheet 19)

(Joins sheet 26)

1 390 000 FEET

1 375 000 FEET

465 000 FEET

North Park Lake

Montour Run

Willow Run

Wildwood

Talley Covey

Pine Creek

ALLISON PARK

BALTIMORE AND OHIO

UCB

UWB

UWD

WhB

WhC

WhD

GSF

GIB

GID

GIC

GpB

GpC

GpD

GQF

GvB

GvC

GvD

ErB

ErC

CaB

CaC

CmB

CmC

RaA

RaB

RyB

BrB

At

Du

HaD

AgB

AgC

UaB

RaB

ErD

UB

N

(Joins Sheet 11)

(Joins sheet 18)

(Joins Sheet 20)

(Joins Sheet 27)

Dorseyville

Deer Creek

1 Mile 5 000 Feet

Scale 1:15 840

20

N

1 Mile

5 000 Feet

Scale 1:15 840

(Joins sheet 12)

(Joins sheet 19)

(Joins sheet 21)

(Joins sheet 28)

1 415 000 FEET

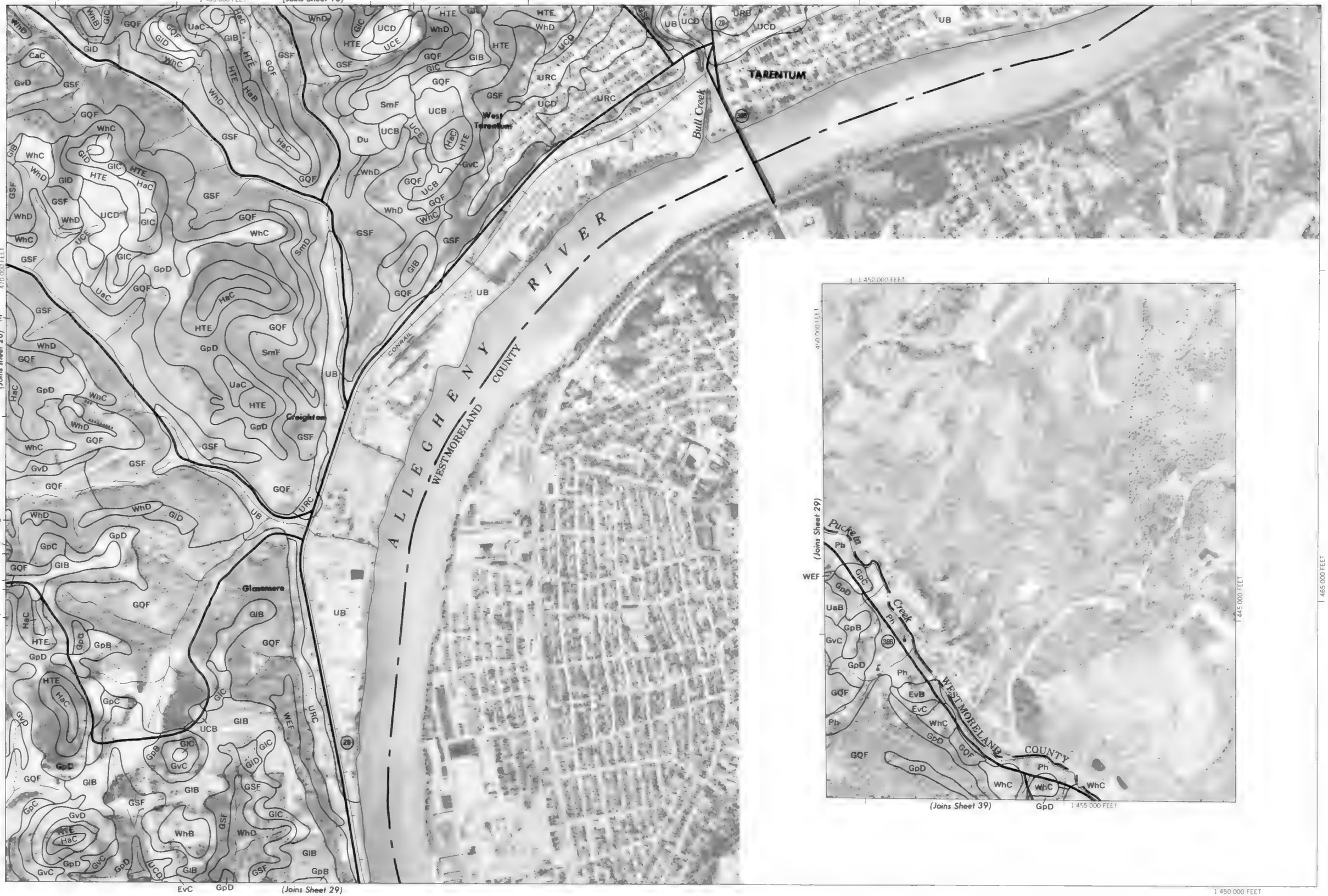
1 430 000 FEET

REMICH AIRPORT

Little Deer Creek

Deer Creek

Indianola


1 435 000 FEET
(Joins Sheet 13)
470 000 FEET
(Joins sheet 20)
HTE
GQF
GvD
GpD
GpC
GID
GQF
GQF
(Joins Sheet 29)
EvC GpD
TARENTUM
Bull Creek
West Tarentum
Creighton
Glassmere
CONRAIL
ALLEGHENY RIVER
WESTMORELAND COUNTY
UB
URC
WEF
1 452 000 FEET
450 000 FEET
(Joins Sheet 29)
Pucketa Creek
WESTMORELAND COUNTY
(Joins Sheet 39)
GpD
1 455 000 FEET
1 450 000 FEET
1 465 000 FEET
445 000 FEET
21
N
1 Mile
5 000 Feet
Scale 1:15 840
0
1 000
2 000
3 000
4 000
5 000

22

N

1 Mile 5,000 Feet

Scale 1:15 840

0 0 1/4 1 000 1/2 2 000 3/4 4 000 1 5 000

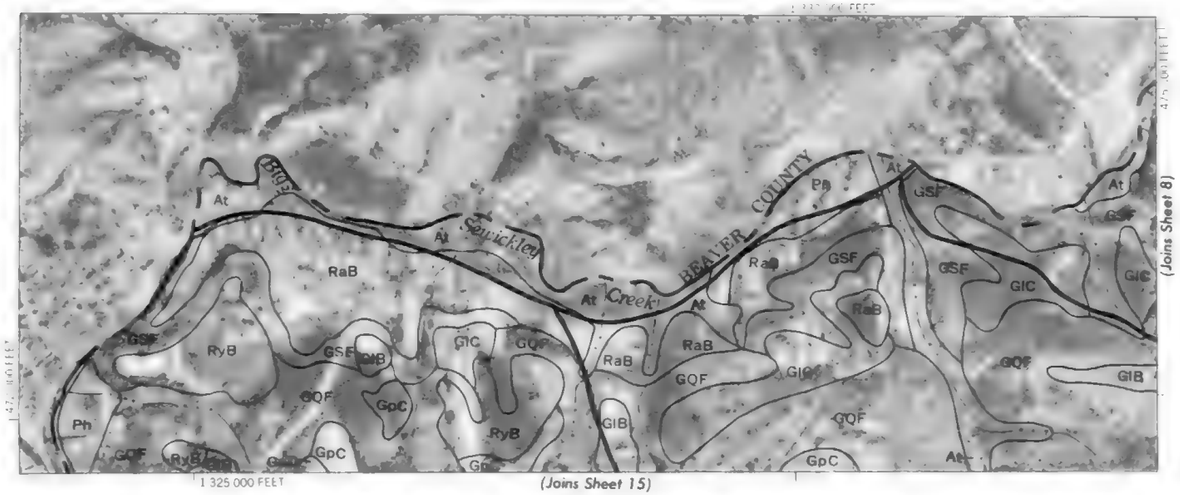
450 000 FEET

1 325 000 FEET

1 310 000 FEET (Joins inset, sheet 30)

1 295 000 FEET

1 455 000 FEET



(Joins Sheet 15)

(Joins Sheet 22)

(Joins Sheet 24)

(Joins Sheet 32)

Leetsdale
Glenwillard
Edgeworth
Sewickley
Osborne
Sewickley Creek
Little Sewickley Creek
Flaugherty Run
DASHIELDS DAM
Stoops Ferry
BRIDGE
CONRAIL
PITTSBURGH
O H I O R I V E R
water

Scale 1:15 840
1 Mile
5 000 Feet

ALLEGHENY COUNTY, PENNSYLVANIA — SHEET NUMBER 24

24

N

1 Mile

5 000 Feet

Scale 1:15 840

(Joins Sheet 16)

(Joins Sheet 23) GID

(Joins sheet 33)

(Joins sheet 25)

Sewickley Hills

Mount Nebo

Stonedale

Killbuck Run

UCE

UCB

UCD

1 335 000 FEET

455 000 FEET

450 000 FEET

(Joins sheet 17)

(Joins sheet 24)

(Joins sheet 26)

(Joins sheet 34)

25

N

1 Mile

5 000 Feet

Scale 1:15 840

26

N

1 Mile

5 000 Feet

Scale 1:15 840

1 000 0 1 000 2 000 3 000 4 000 5 000

1 390 000 FEET

1 395 000 FEET

1 380 000 FEET

1 375 000 FEET

(Joins sheet 18)

(Joins sheet 25)

(Joins sheet 27)

(Joins sheet 35)

ALLISON PARK

GLENSHAW

Little Pine Creek

Pine Creek

Girty Run

Ohio River

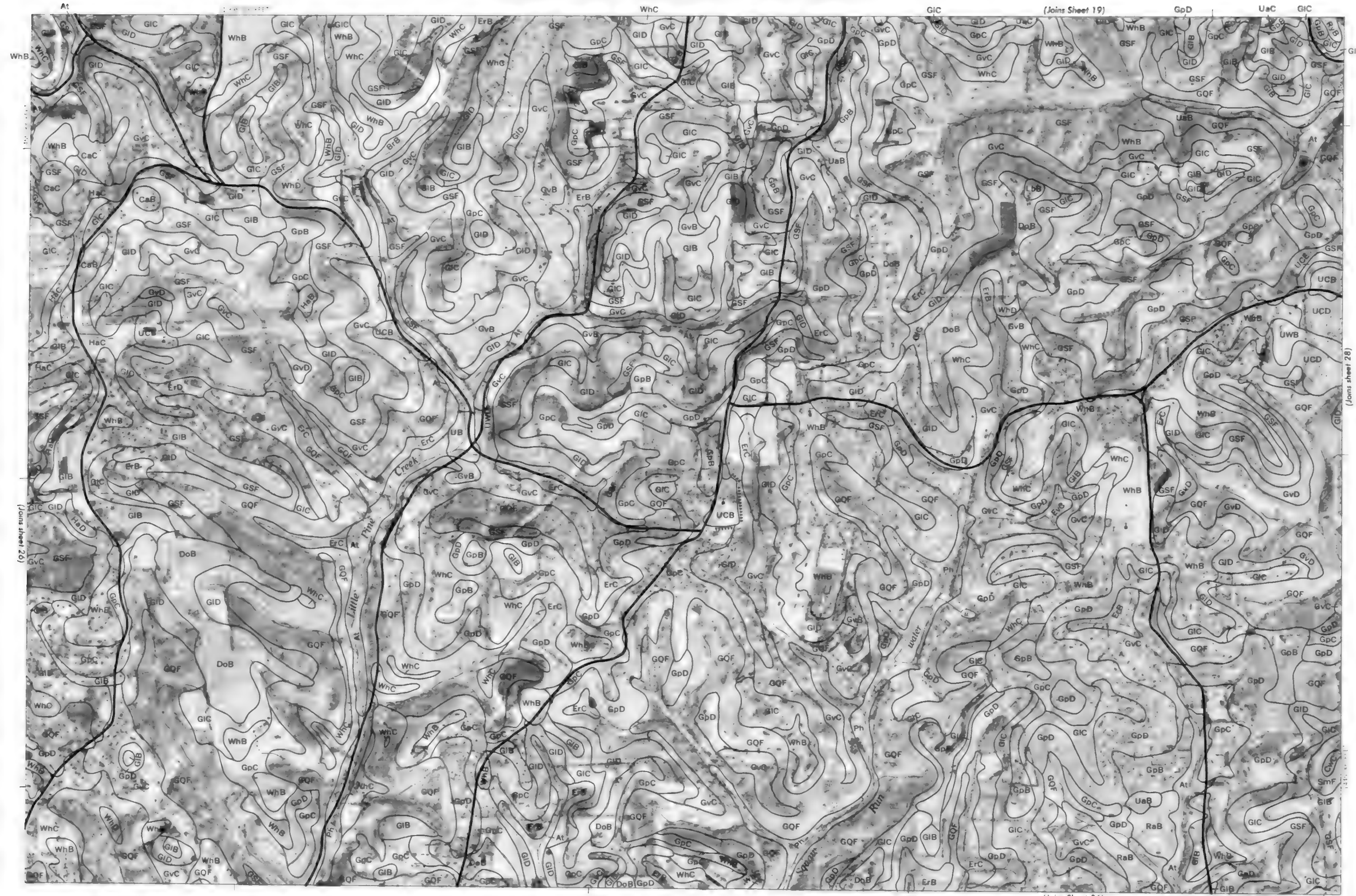
Baltimore and Ohio

Pittsburgh and Lake Erie

Pittsburgh and West Virginia

Elfinwild

UCB UCD UGB UaB UaC RaA RaB RaC RyB BrB CaB CmB CmC CmD ErB ErC ErD GIB GIC GID GQF GSF GvB GvC GvD GpB GpC GpD HaC WhB WhC WhD WhE UWD At


(Joins Sheet 19)
(Joins sheet 26)
(Joins sheet 28)
(Joins Sheet 36)
Pine Creek
Little Pine Creek
Squaw Run
Water
Ph
At
ErB
GQF
GIB
27
N
1 Mile
5 000 Feet
Scale 1:15 840
0
1/4
1/2
3/4
1
1 000
2 000
3 000
4 000
5 000

28

N

1 Mile

5 000 Feet

Scale 1:15 840

(Joins Sheet 20)

(Joins Sheet 27)

(Joins Sheet 29)

(Joins Sheet 37)

1 445 000 FEET

1 415 000 FEET

Deer Creek

Little Deer Creek

Creek

CREEK

ALLEGHENY RIVER

Hamar Heights

Harwick

Natrona Heights

Creighton

Acmetonia

Harmarville

Twelvepole

UNION BESSEMER AND LAKE ERIE

DBSR

CONRAIL

QUARRY

INTERCHANGE NO 3

LOCK AND DAM NO 3

River Valley

(Joins Sheet 21)

(Joins Sheet 28)

(Joins Sheet 38)

(Joins inset, sheet 21)

WESTMORELAND COUNTY

ALLEGHENY RIVER

Pucketa Creek

Orville

SPRINGDALE

Logans Ferry

Logans Ferry Heights

Berking

29

N

1 Mile

5 000 Feet

Scale 1:15 840

445 000 FEET

1 450 000 FEET

30

N

1 Mile

5 000 Feet

0

Scale 1:15 840

1/4

1 000

1/2

2 000

3/4

3 000

1

4 000

5 000

1 313 000 FEET

460 000 FEET

(Joins sheet 22)

(Joins sheet 15)

(Joins sheet 31)

(Joins sheet 40)

1 276 000 FEET

OHIO RIVER

BEAVER COUNTY

UNION RESSEMER AND LAKE ERIE

Buckley Cr

UB

URB

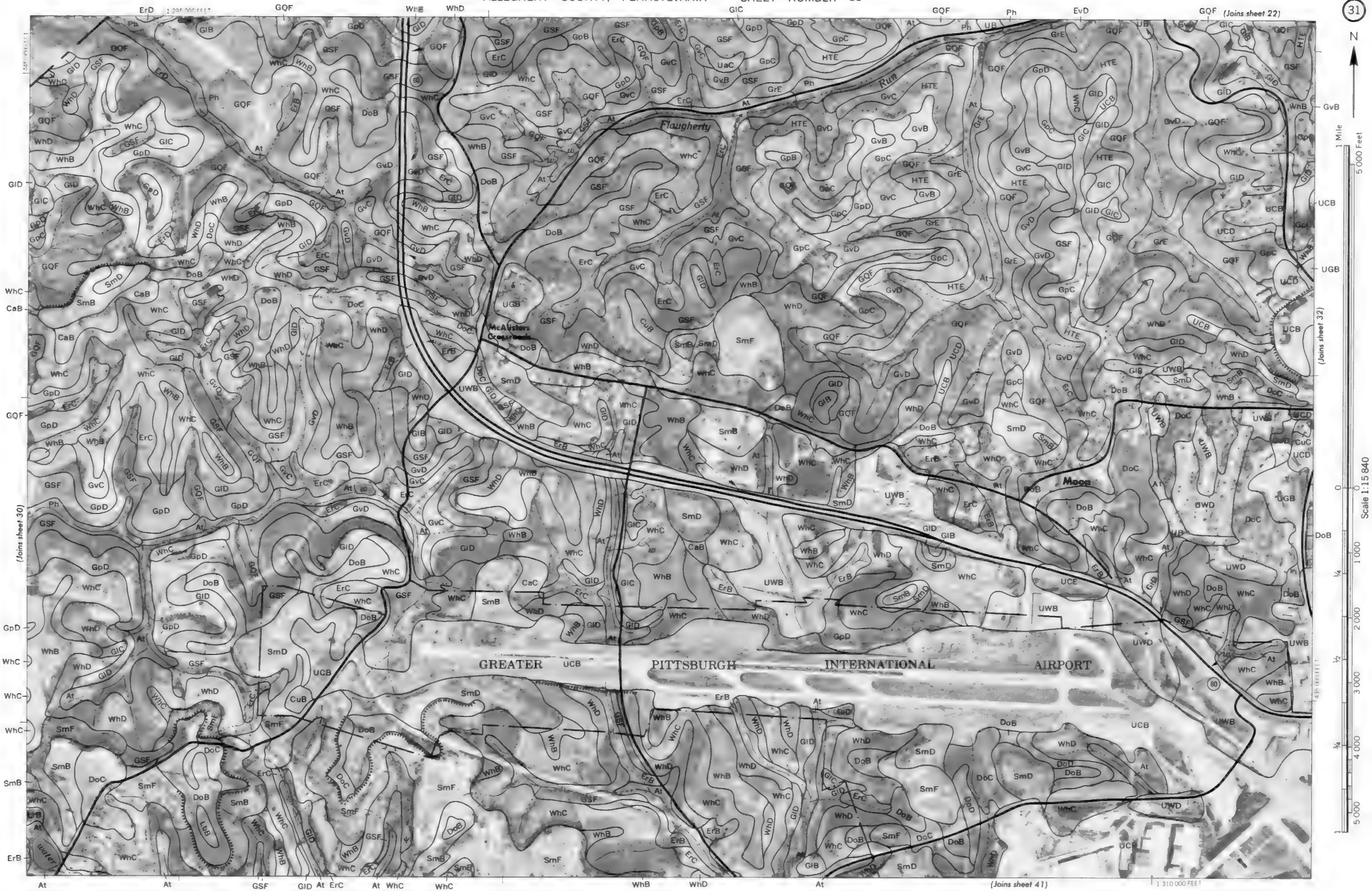
URC

GQF

GvC

GIC

ErB


Flaugherty Run
McAlisters Crossroads
Moon
GREATER PITTSBURGH INTERNATIONAL AIRPORT
(Joins sheet 22)
(Joins sheet 30)
(Joins sheet 32)
(Joins sheet 41)
1 Mile
5 000 Feet
Scale 1:15 840
N

32

N

1 Mile

5,000 Feet

Scale 1:15 840

1 315 000 FEET

(Joins sheet 23)

(Joins sheet 31)

(Joins sheet 33)

(Joins sheet 42)

OHIO RIVER

CORAOPOLIS

Neville Island

GREATER PITTSBURGH INTERNATIONAL AIRPORT

Montour Run

PITTSBURGH

TLAMS

CONRAIL

33

N

(Joins Sheet 24)

(Joins Sheet 34)

(Joins Sheet 32)

(Joins Sheet 43)

1 335 000 FEET

1 350 000 FEET

1 435 000 FEET

1 Mile

5 000 Feet

Scale 1:15 840

0 1 000 2 000 3 000 4 000 5 000

0 ¼ ½ ¾ 1

Glenfield

Killbuck Run

DIXMONT STATE HOSPITAL

OHIO RIVER

Neville Island

Montour Run

Moore Run

Groveton

EMSWORTH

EMSWORTH DAM

LOCKS

BEN AVON

Lowries Creek

CONRAIL

ERIE

WhC GIC GpC GID WhB GpC GQF ErB GpD WhB GID WhC GQF GpC GIC WhB GpD GID ErC GpC GID GpD GIB GpC UCE GQF ErD Run UB GQF GpD GQF GvB GpD GvD DoD WhB GIB DoD GpD CuC DoB DoC CuB CuD WhC GpD GQF GvC GpD URB GvD GpC GpD GpB GpC GQF GvC GpD DoB GvC GQF GpB GpD HTE GQF GvC GpC GvD HTE GpB GpD CwB HaC UCB HaB HaC HaD HTE UCD GpC HTE GQF HaC HTE GpD At ErC GpC GpD GQF CuB GpD RaB GpC URC URB GQF UCD UB URB UCD URB UB URC GQF UB UGB HTE Ph RaC EvC RaB CuD CuC DoC DoB CuB GrE GrD GvC UCB EMSWORTH DAM ERIE LOCKS BEN AVON GQF GpD GpC

34

N

1 Mile

5 000 Feet

Scale 1:15 840

0 ¼ ½ ¾ 1

1 000 2 000 3 000 4 000 5 000

1 370 000 FEET

1 360 000 FEET

1 355 000 FEET

(Joins sheet 25)

(Joins sheet 33)

(Joins sheet 35)

(Joins sheet 44)

UCB MILITARY RESERVATION

Lauries Creek

Chartiers Run

WEST VIEW

Ben Avon Heights

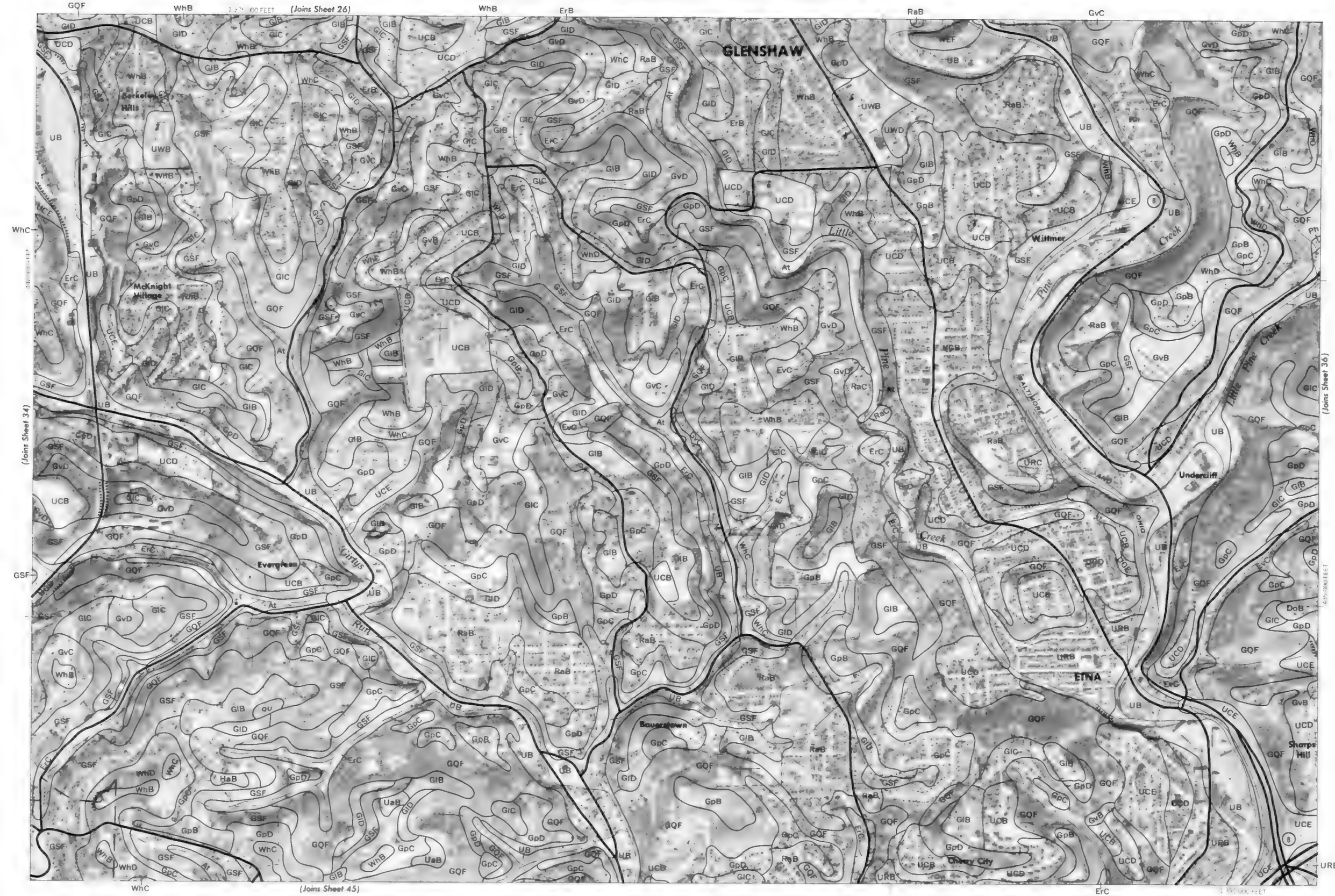
BEN AVON

AVALON

OHIO RIVER

CONRAIL

Neville Island


GLENSHAW
McKnight Village
Evergreen
Bayerstown
ETNA
Undercliff
Cheery City
Sharps Hill
Berkeley Hills
Little Pine Creek
Pine Creek
Girtus Run
Willmer
(Joins Sheet 26)
(Joins Sheet 34)
(Joins Sheet 36)
(Joins Sheet 45)
1 Mile
5 000 Feet
Scale 1:15 840
N
35

36

N

1 Mile

5 000 Feet

Scale 1:15 840

1 410 000 FEET

(Joins sheet 27)

(Joins sheet 35)

(Joins sheet 37)

(Joins sheet 46)

1 395 000 FEET

FOX CHAPEL

Underciff

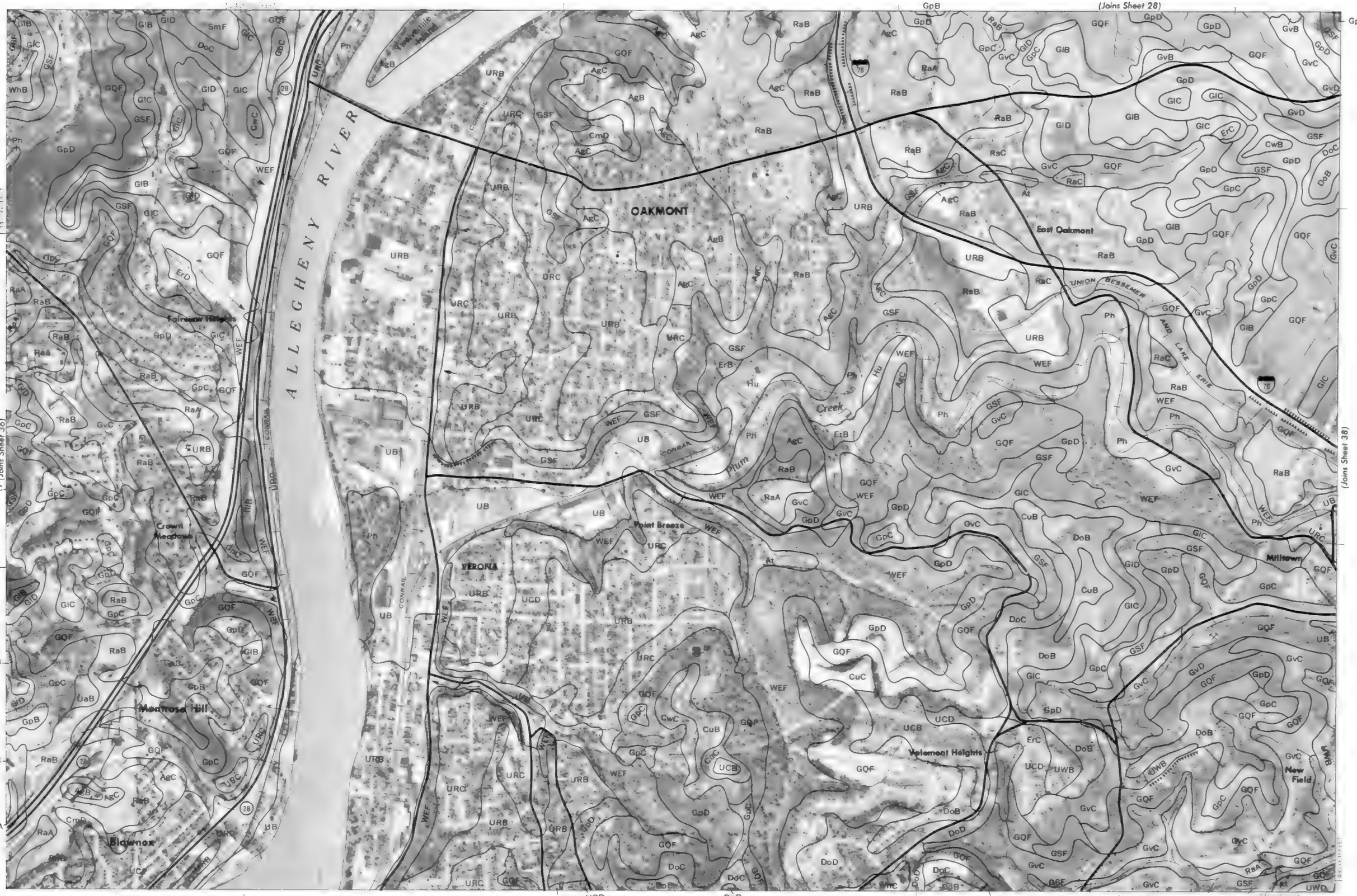
Sharps Hill

Park View

SHARPSBURG

UCE 28

WhB GQF GSF GIB GpD DoB ErB WhC GIC GQB GpC GvC GID GpB GpD UaC WhD GQF GSF GIB GIC GpD GpB GvC GID GIB GIC DoB GpD GpB GpC GpD GQF GID GvC GpC GID GQ Ph GID DoB GpC UaC GQF GpD UaB GQF GIC GQF GID GIC WhC GQF GpC GQF GpD GQF GpC ErB GpD GIB GSF GIC GpD GpC GpB GQF Ph GSF GpD GpC GQF GIB GIC GpD ErC GQF GpC GSF ErB GSF WhC GIC GpD GIB DoB GQF GpC GpD GIC GpB GpD GpC GQF GpC GpD GpB GpD GIC GpC GpD GIC UaC GpD GID GIC GpC GpD GpC GpD GpB GvC GQF GpC GpD GQF UaB GpD GpC GpD GQF GpC GpD GIC GpC GpD GQF GpC GpD GvB UCD UWD UCE GQF ErC UCE 28 URB SHARPSBURG GQF GIC URB URB RaA


ALLEGHENY RIVER
OAKMONT
East Oakmont
Fairview Heights
Crown Meadows
Monroe Hill
Blawnox
VERONA
Point Breeze
Millstown
New Field
Valemont Heights
Plum Creek
UNION BESSEMER AND LAKE ERIE
CONRAIL
(Joins Sheet 36)
(Joins Sheet 38)
(Joins Sheet 47)
37
N
1 Mile
5 000 Feet
Scale 1:15 840

38

N

1 Mile

5 000 Feet

Scale 1:15 840

(Joins Sheet 29)

(Joins Sheet 37)

(Joins Sheet 39)

(Joins Sheet 48)

1 435 000 FEET

PLUM

Leechburg

Unity Junction

New Texas

Lake Erie Bessemer and Lake Erie Railroad

Plum Creek

Little Plum Creek

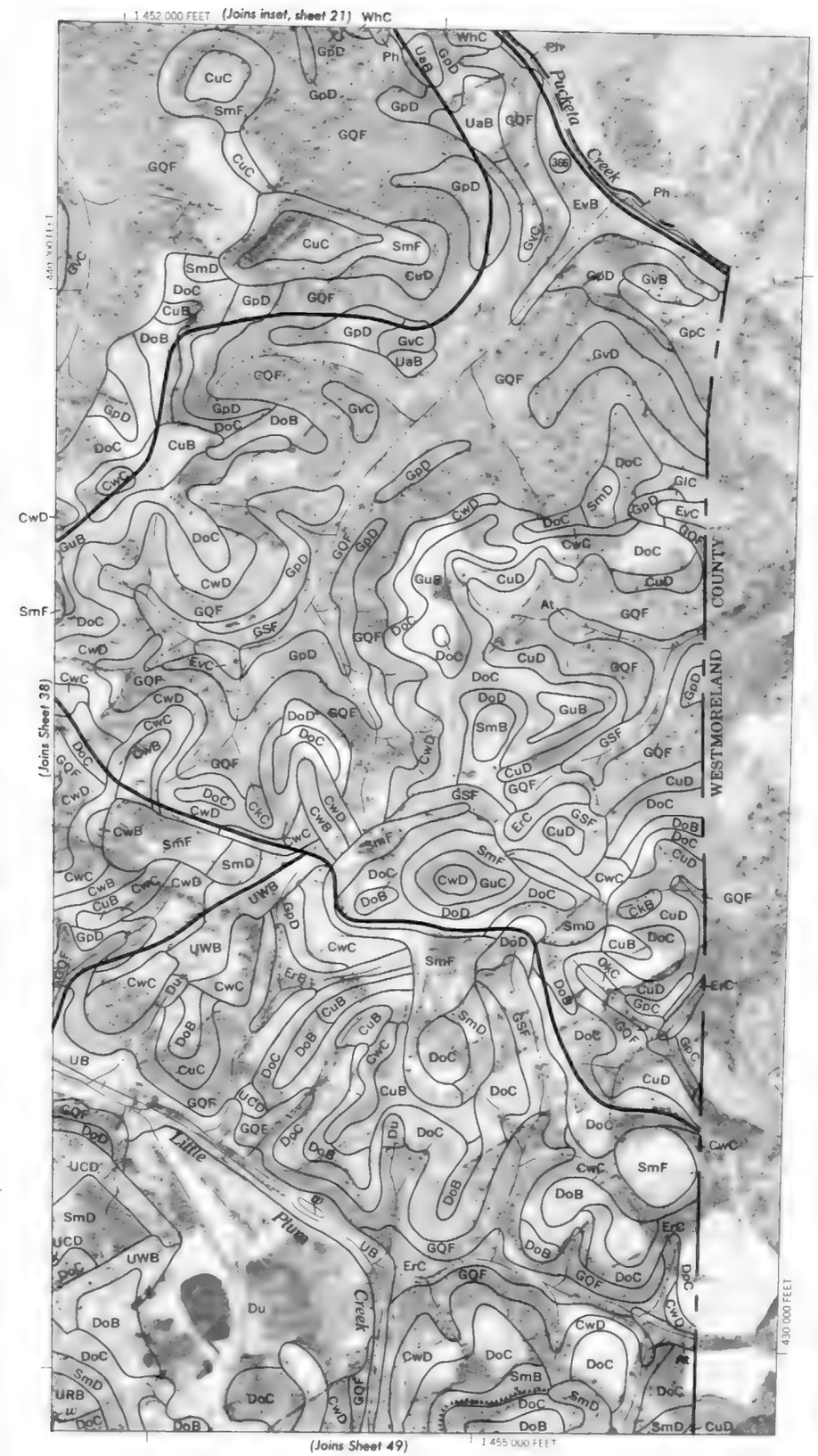
Bessemer Creek

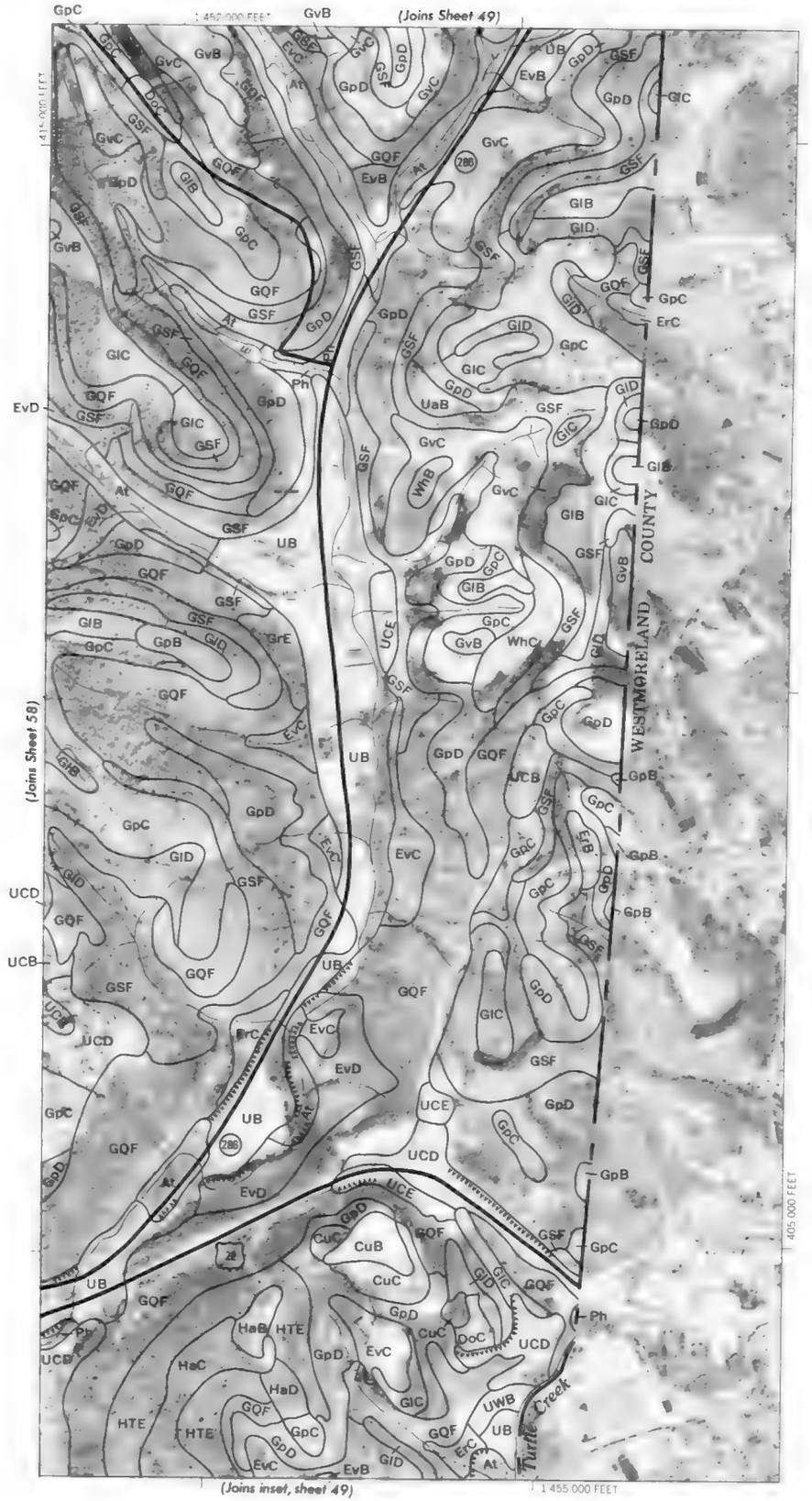
Creek

Union Railroad

Lake Erie and Western Railroad

Ren ton


1 452 000 FEET
(Joins inset, sheet 21)
WhC
Puckety Creek
WESTMORELAND COUNTY
Little Plum Creek
(Joins Sheet 38)
(Joins Sheet 49)
1 455 000 FEET
430 000 FEET


1 452 000 FEET
(Joins Sheet 49)
(Joins Sheet 58)
WESTMORELAND COUNTY
Turtle Creek
(Joins inset, sheet 49)
1 455 000 FEET
405 000 FEET


39
N
1 Mile
5 000 Feet
Scale 1:15 840

ALLEGHENY COUNTY, PENNSYLVANIA — SHEET NUMBER 40

40

N

1 Mile

5 000 Feet

Scale 1:15 840

0 ¼ ½ ¾ 1

1 000 2 000 3 000 4 000 5 000

1 INCH = 1 320 FEET

1 : 275 000 FEET

(Joins Sheet 30)

(Joins Sheet 41)

(Joins Sheet 50)

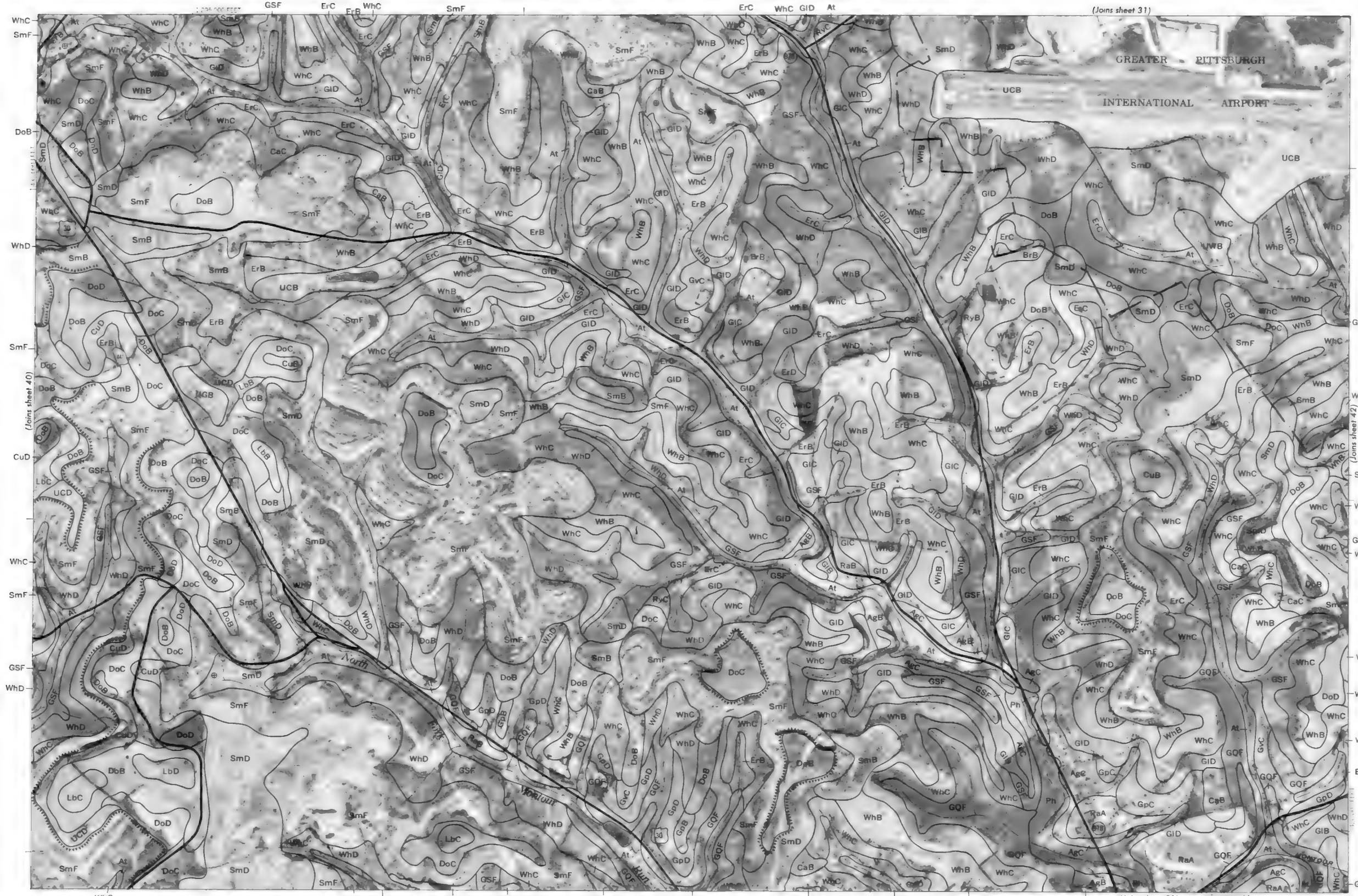
BEAVER COUNTY

WASHINGTON COUNTY

Potato Garden Run

Clinton

Ne


GREATER PITTSBURGH INTERNATIONAL AIRPORT
UCB
(Joins sheet 31)
(Joins sheet 40)
(Joins sheet 42)
(Joins sheet 51)
North Fork Rose Run
Montour Run
GSF
WhC
WhD
WhB
SmF
SmD
SmB
DoB
DoC
DoD
ErB
ErC
GID
At
GQF
GpD
GpB
CaB
CaC
AgB
AgC
RaA
RaB
Ph
GvC
GIB
GIC
RyB
BrB
CuB
CuD
LbB
LbC
LbD
UCD
MGB
Scale 1:15 840
1 Mile
5 000 Feet
N
41

42

N

1 Mile

5 000 Feet

Scale 1:15 840

(Joins sheet 32)

(Joins sheet 41)

(Joins sheet 43)

(Joins sheet 52)

1 315 000 FEET

1 330 000 FEET

GREATER PITTSBURGH INTERNATIONAL AIRPORT

RESURRECTION CEMETERY

Montour Run

Scott Station

UCB UCD GSF WhC WhD WhB GID GIC ErB GQF GvC GvD GvB DoB DoC DoD CuC CuD SmD SmB LbC ErC GIB UWB UB At GSF GpC GpD GuB UaB RyB AgB RaB Ph GrE HTE EvC

AgC


(Joins Sheet 33)
OHIO RIVER
PITTSBURGH AND LAKE ERIE
KENMAWR
Mount
Run
Forest
Grove
Pitrock
CREEK
CHARTIERS
PITTSBURGH CHARTIERS AND YOUGHIOGHENY
(Joins sheet 42)
(Joins sheet 44)
(Joins Sheet 53)
43
N
1 Mile
5 000 Feet
Scale 1:15 840
Ne

ALLEGHENY COUNTY, PENNSYLVANIA — SHEET NUMBER 44

(44)

N

1 Mile

5 000 Feet

Scale 1:15 840

1 000 FEET

(Joins sheet 34)

(Joins sheet 43)

(Joins sheet 45)

(Joins sheet 54)

1 370 000 FEET

1 355 000 FEET

MC KEES ROCK

Brunot Island

OHIO RIVER

CHARTIERS CREEK

YOUGHIOGHENY

PITTSBURGH

CONRAIL

AND

water

URC URB UB UCE UCD UCB GQF GSF GIC GpD GpC GIB GQF WhB GID UaB ErB RaC RaB RaA Ne GrE UWD

(Joins Sheet 35)

(Joins sheet 44)

(Joins sheet 46)

(Joins sheet 55)

(Joins Sheet 55)

45

N

1 Mile

5 000 Feet

Scale 1:15 840

1 390 000 FEET

1 420 000 FEET

MILLVALE

PITTSBURGH

RIVER

ALLEGHENY

Pine Creek

Girtys Run

Girtys Run

Troy Hill

Spring Hill

Lawrenceville

Stanton Heights

Bloomfield

ALLEGHENY CEMETERY

water

BALTIMORE AND OHIO

CONRAIL

OHIO

BALTIMORE

AND

OHIO

46

N

1 Mile

5 000 Feet

Scale 1:15 840

0 ¼ ½ ¾ 1

1 100 2 000 3 000 4 000 5 000

(Joins Sheet 36)

1 410 000 FEET

430 000 FEET

420 000 FEET

(Joins Sheet 45)

(Joins Sheet 47)

(Joins Sheet 56) 1 395 000 FEET

SHARPSBURG

ASPINWALL

HIGHLAND PARK

Morningside

Highland

East Liberty

PITTSBURGH

Squaw Run

ALLEGHENY RIVER

LOCK NO 2

CONRAIL

water

47

N

1 Mile

5 000 Feet

Scale 1:15 840

ALLEGHENY RIVER

Rosedale

Nadine

Sandy Creek

Crescent Hills

Redi

Eastwo

Penn Ridge

Lebanon Heights

Churchill Valley

North Bessemer

Thompson Run

BESSEMER AND LAKE ERIE R.R.

(Joins Sheet 46)

(Joins Sheet 48)

(Joins Sheet 37)

(Joins Sheet 57)

48

N

1 Mile

5 000 Feet

Scale 1:15 840

0 ¼ ½ ¾ 1

1 000 2 000 3 000 4 000 5 000

(Joins Sheet 38)

(Joins sheet 47)

(Joins Sheet 49)

(Joins Sheet 58)

1 450 000 FEET

1 425 000 FEET

1 435 000 FEET

Little Plum Creek

Plum Creek

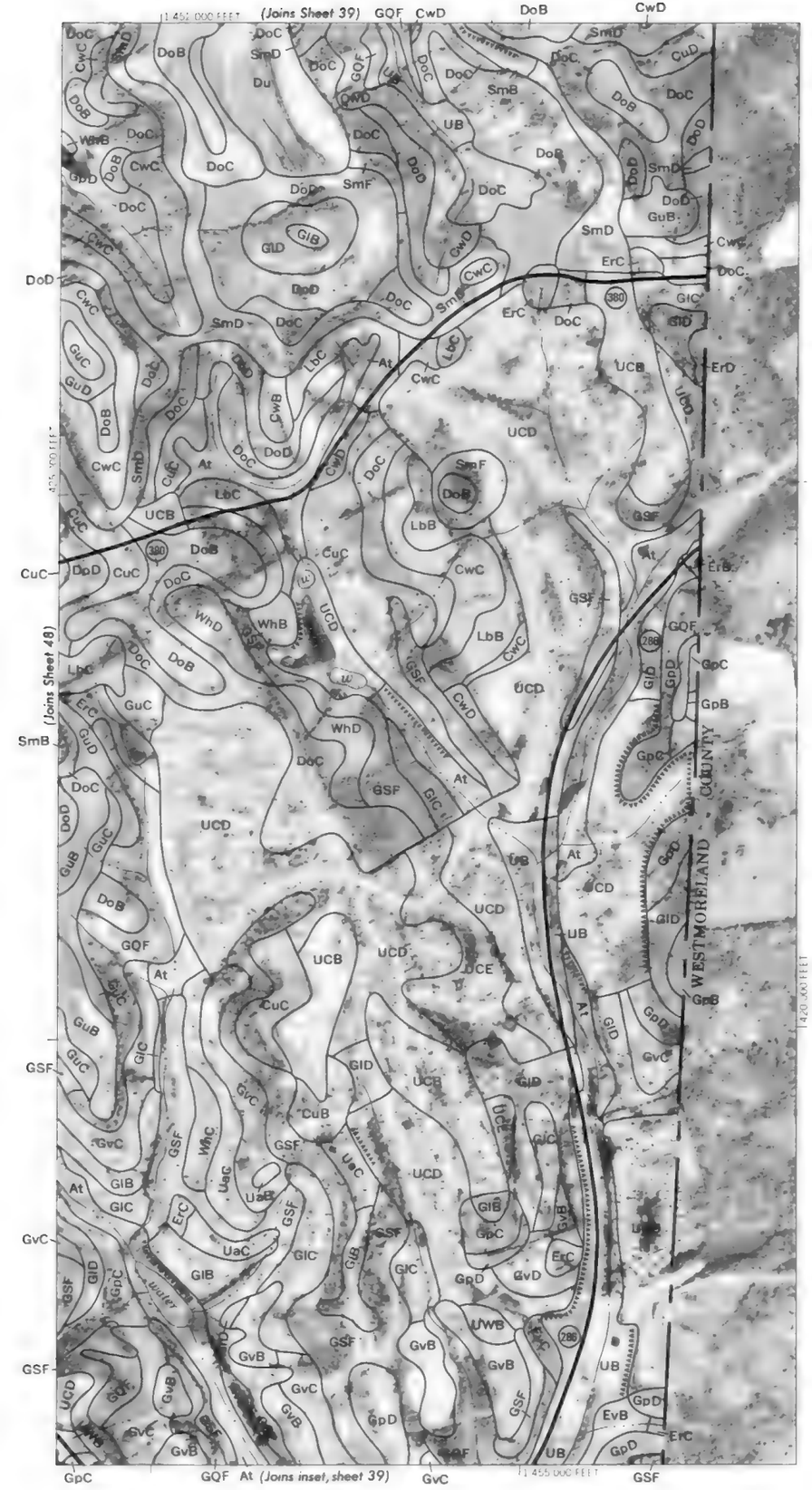
Regency Park

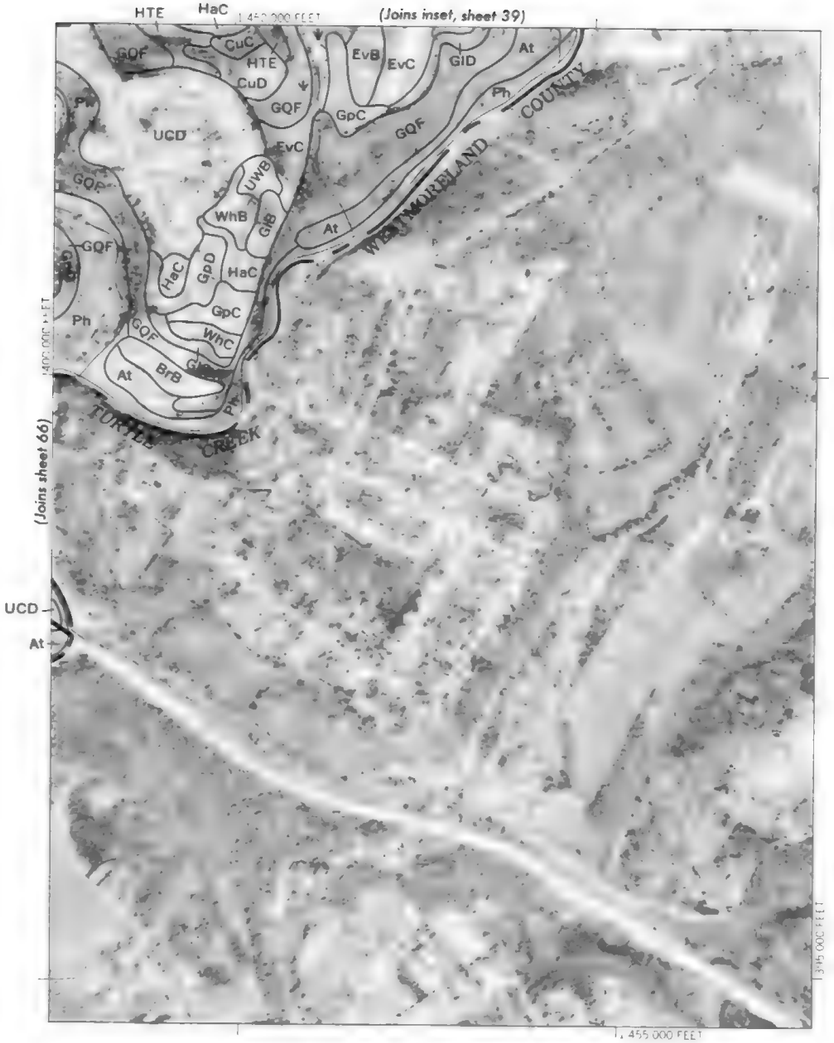
Universal

Center

Eastview

UNION BESSEMER AND LAKE ERIE


1 452 000 FEET
(Joins Sheet 39)
(Joins Sheet 48)
1 455 000 FEET
420 000 FEET
WESTMORELAND COUNTY
GQF
CwD
DoB
CwC
DoC
SmD
SmB
SmF
GuC
GuD
GuB
GlD
GlB
ErC
ErD
UCB
UCD
LbC
LbB
CuC
CuD
CuB
WhB
WhD
GpD
GpC
GpB
GvC
GvD
GvB
GSF
UaC
UaB
UWB
UB
At
EvB
EvC
EvD
GIC
DoD
DoE
UCE
380
288


HTE
HaC
1 452 000 FEET
(Joins inset, sheet 39)
(Joins sheet 66)
1 455 000 FEET
WESTMORELAND COUNTY
TURTLE CREEK
GQF
CuC
CuD
HTE
EvB
EvC
GlD
At
Ph
UCD
GpC
UWB
WhB
GlB
HaC
GpD
WhC
BrB
Pit


49
N
1 Mile
5 000 Feet
Scale 1:15 840
0
1/4
1/2
3/4
1
1 000
2 000
3 000
4 000
5 000

ALLEGHENY COUNTY, PENNSYLVANIA — SHEET NUMBER 50

50

N

1 Mile

5 000 Feet

Scale 1:15 840

0 ¼ ½ ¾ 1

0 1 000 2 000 3 000 4 000 5 000

1 290 000 FEET

415 000 FEET

410 000 FEET

405 000 FEET

390 000 FEET

1 305 000 FEET

1 275 000 FEET

(Joins sheet 40)

(Joins sheet 59)

(Joins sheet 67)

(Joins sheet 51)

Bald Knob

Robinson Run

Ne

Ln

Ti

GSF LbC LbB CuC CuD CuB GuD GuC GuB DoD DoC DoB SmD SmF SmB WhC WhB GID At SmoF CaB ErB CkC CkB UCB UGD UB

51

N

1 Mile

5 000 Feet

Scale 1:15 840

0 1/4 1/2 3/4 1 000 2 000 3 000 4 000 5 000

(Joins Sheet 44)

(Joins Sheet 50)

(Joins Sheet 52)

(Joins Sheet 59)

410 000 FEET

310 000 FEET

Monlour

North Fork

Montour Run

Pinkerton Run

South Fork

Imperial

Santiago

Champion

ALLEGHENY COUNTY, PENNSYLVANIA — SHEET NUMBER 52

52

N

1 Mile

5 000 Feet

Scale 1:15 840

0 1/4 1/2 3/4 1

1 000 2 000 3 000 4 000 5 000

(Joins Sheet 42)

(Joins Sheet 51)

(Joins Sheet 53)

(Joins Sheet 60)

Fayetteville

Cliff Mine

Beechcliff

Montour Run

COUNTY REGIONAL PARK

N

1 Mile

5 000 Feet

Scale 1:15 840

1 350 000 FEET

1 350 000 FEET

(Joins Sheet 52)

(Joins Sheet 43)

(Joins Sheet 54)

(Joins Sheet 61)

Moon Run

CHARTIERS CREEK

CHARTIERS CREEK

Thornburg

Rosslyn Farms

PITTSBURGH

TOUGHKENENAMON

UNDER CONSTRUCTION

Gayly

54

N

1 Mile

5 000 Feet

Scale 1:15 840

0 ¼ ½ ¾ 1

0 1 000 2 000 3 000 4 000 5 000

(Joins sheet 44)

(Joins Sheet 53)

(Joins sheet 55)

(Joins sheet 62) CuD

415 000 FEET

Sheraden
Carlisle
Elliott
CRAFTON
Idlewood
Brunot Island
PITTSBURGH
North Side
Manchester
OHIO RIVER
WEST END BRIDGE
West End
Allegheny River
Monongahela River
POINT STATE PARK
Duquesne Heights
Mount Washington
MOUNT WASHINGTON PARK
Westwood
CHARTIERS CREEK
INTERCHANGE NO 20
PITTSBURGH AND LAKE ERIE RR
CONRAIL
NORFOLK AND WESTERN
FT PITT TUNNEL
FT PITT BRIDGE
Squirrel Run

URC GvC CuC CuD GvD RaA RaB AgB GSF UCD UCE UCB URB UB GOF GID GIC GIB UWB UGB UGD UGE DoC DoD DoB SmB SmD SmF GuB GuC GuD CkC WhB Ne Hu At AgB GID CwD

(Joins Sheet 54)

(Joins Sheet 45)

(Joins Sheet 63)

(Joins sheet 56)

55

N

1 Mile

5 000 Feet

Scale 1:15 840

PITTSBURGH

ALLEGHENY

RIVER

MONONGAHELA

RIVER

LIBERTY BRIDGE

LIBERTY TUNNEL

GRANDVIEW PARK

SCHENLEY PARK

Oakland

Shadyside

Bellefield

Schenley Heights

Knoxville

Saint Clair

CONRAIL

PITTSBURGH AND LAKE ERIE

BALTIMORE AND OHIO

UCD GSF

UCE

UCB

UCD

UWD

UWB

URB

URC

UB

GOF

GSF

WEF

UGD

DoD

GpC

GpD

GlB

GlD

ErD

RaB

water

1 390 000 FEET

56

N

1 Mile

5 000 Feet

Scale 1:15 840

0 ¼ ½ ¾ 1

1 000 2 000 3 000 4 000 5 000

(Joins Sheet 46)

(Joins Sheet 55)

(Joins Sheet 57)

(Joins Sheet 64)

1 410 000 FEET

415 000 FEET

405 000 FEET

1 395 000 FEET

PITTSBURGH

FRICK PARK

SQUIRREL HILL TUNNEL

CONRAIL

URB URC UCB UCD UCE UGB UGD UWB UWD GQF GSF GSE GpB GpC GpD GvD GIB GIC GuB CuB CuD GvB WhB WhC WhD DoB DoC DoD UaB Ph Dw RaB SmB UB


PITTSBURGH
Saw Mill Run
Thompson Run
UNION
(Joins Sheet 58)
(Joins Sheet 35)
(Joins Sheet 65)
(Joins Sheet 47)
BR 22
1 Mile
5 000 Feet
Scale 1:15 840
1:405 000 FEET

58

N

1 Mile

5 000 Feet

Scale 1:15 840

(Joins Sheet 48)

(Joins Sheet 57)

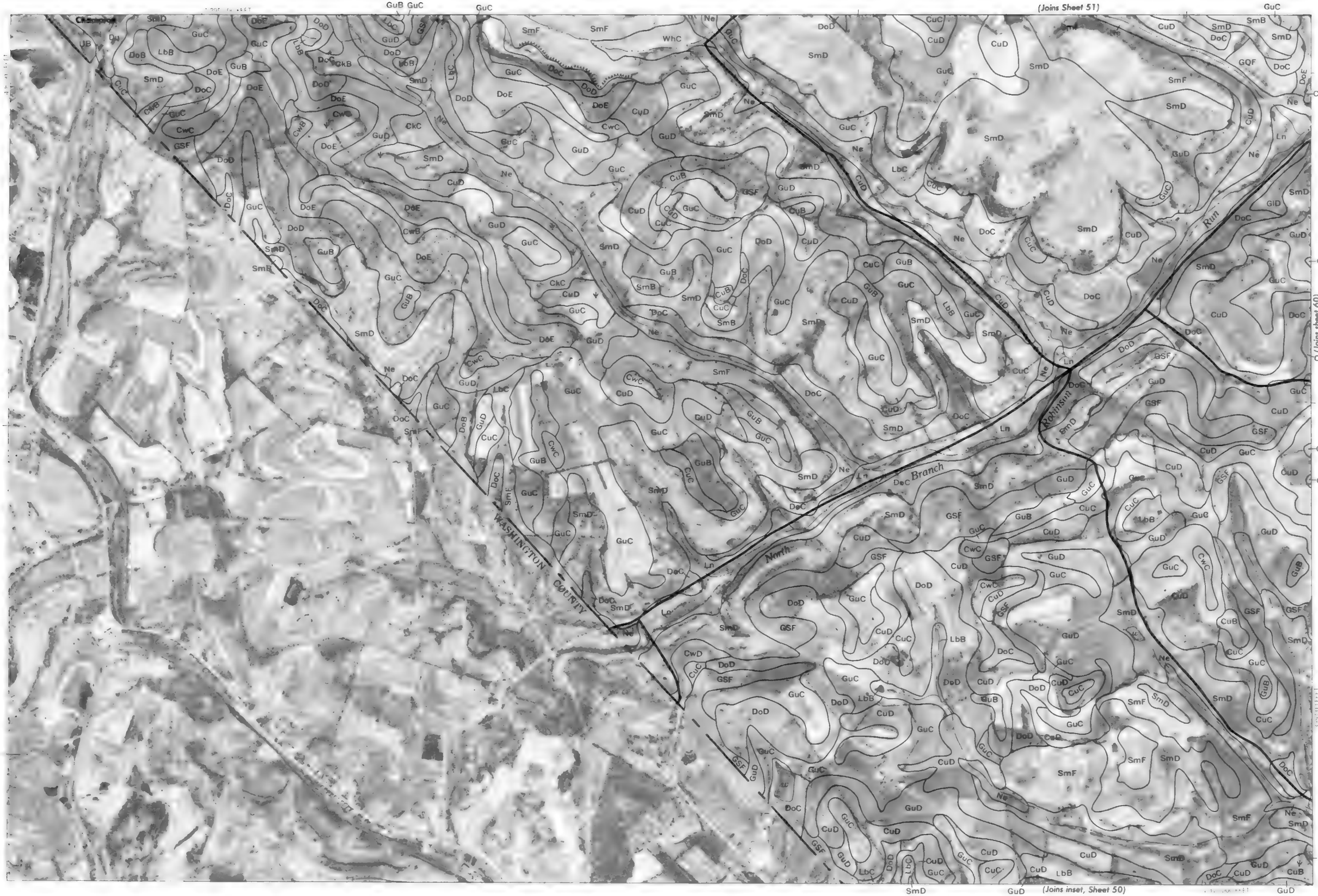
(Joins inset, sheet 39)

(Joins Sheet 66)

PITTSBURGH MONROEVILLE AIRPORT

Thompson Run

ALLEGHENY COUNTY, PENNSYLVANIA — SHEET NUMBER 59



60

N

1 Mile

5 000 Feet

Scale 1:15 840

0 1/4 1/2 3/4 1

5 000 4 000 3 000 2 000 1 000 0

1 315 000 FEET

1 330 000 FEET

405 000 FEET

(Joins sheet 52)

(Joins sheet 59)

(Joins sheet 67)

(Joins sheet 61)

COUNTY REGIONAL PARK

Noblestown

Oakdale

Sturgeon

Beechmont

Robinson Run

North Branch Robinson Run

Gregg

Ln

Ne

UB

UCD

UGB

UGD

GSF

GQF

GID

GIC

GuC

GuD

GuB

CuC

CuD

CuB

SmD

SmF

SmB

DoC

DoD

DoB

CwC

CwD

CwB

WhC

WhD

WhB

ErC

ErB

GpD

GpB

CkC

CkB

LbC

LbB

GvC

GvB

CaB

GoB

Conrail

978

(Joins Sheet 53)
(Joins Sheet 60)
(Joins Sheet 62)
(Joins sheet 68)

Rennerdale
Ewingville
CARNEGIE
Heidelburg
Glendale
WOODVILLE STATE HOSPITAL
Robinson Run
CHARTIERS CREEK
PITTSBURGH, CHARTIERS AND YOUGHIOGHENY
CONRAIL
WESTERN NORFOLK

61
N
1 Mile
5 000 Feet
Scale 1:15 840

62

N

1 Mile

5 000 Feet

Scale 1:15 840

0 0 ¼ ½ ¾ 1

1 000 2 000 3 000 4 000 5 000

400 000 FEET

CHARTIERS CREEK

CARNEGIE

GREEN TREE

PITTSBURGH

DORMONT

East Carnegie

Rook

CARNEGIE PARK

Banksville

South Hills

Brookline

Edgebrook

Overbrook

West Liberty

Beltzhoover

Summit

WESTERN AND NORFOLK AND LIBERTY

(Joins Sheet 54)

(Joins Sheet 61)

(Joins Sheet 63)

(Joins sheet 69)

URC URB UB GSF AgB AgC DoB DoC DoD DoE CuB CuC CuD GID WhB WhC UCB UCD UCE UGB UGD UWB UWD Ne RaB CmC GuB GuC

(Joins Sheet 55)

(Joins Sheet 62)

(Joins Sheet 64)

(Joins Sheet 70)

63

N

1 Mile

5 000 Feet

Scale 1:15 840

1 0 1 000 2 000 3 000 4 000 5 000

1 400 000 FEET

1 395 000 FEET

1 390 000 FEET

Knoxville

Beltzhoover

McKINNEY PARK

Mount Oliver

Saint Clair

Carrick

Edgebrook

Overbrook

Hazelwood

Glenwood

PITTSBURGH

MONONGAHELA RIVER

Saw Mill Run

PITTSBURGH AND LAKE ERIE

BALTIMORE AND OHIO

NORFOLK AND WESTERN

LIBERTY TUNNEL

GSF GQF UCB UCD UCE UGB UGD UB URB GIC Du DuB DuC DuD DoB DoC DoD DoE CuB CuC CuD GuB GuC SmB SmD SmF Dw DwD UwD WhC CwC

N

1 Mile 5 000 Feet

Scale 1:15 840

(Joins sheet 56)

(Joins sheet 63)

(Joins sheet 65)

(Joins sheet 71)

PITTSBURGH

SWISSVALE

RANKIN

HOMESTEAD

WEST HOMESTEAD

MUNHALL

Whitaker

Hays

Hazelwood

MONONGAHELA RIVER

BALTIMORE AND OHIO

PITTSBURGH AND LAKE ERIE

CONRAIL

UNION

SLEEPY HOLLOW BRIDGE

PITTSBURGH AND LAKE ERIE

BALTIMORE AND OHIO

UCD UCE UCB UGB UGD URB UB UWB GQF GSF GID GIB GIC SmB SmD CuB CuC CuD DoB DoC DoD GpC Ne RaB WhB WhC CwB Dw


FOREST HILLS
Braddock Hills
NORTH BRADDOCK
BRADDOCK
EAST PITTSBURGH
Chalfant
TURTLE CREEK
Newtown
West Wilmerding
WILMERDING
Thompson Run
TURTLE CREEK
Turtle Creek
MONONGAHELA RIVER
LOCK NO 2
PITTSBURGH AND LAKE ERIE
BALTIMORE AND OHIO
CONRAIL
UNION
(Joins sheet 57)
(Joins sheet 66)
(Joins sheet 64)
(Joins sheet 72)
1415 000 FEET
1 400 000 FEET
1 395 000 FEET
65
N
1 Mile
5 000 Feet
Scale 1:15 840
0
1/4
1/2
3/4
1
1 000
2 000
3 000
4 000
5 000

66

N

1 Mile

5 000 Feet

0

Scale 1:15 840

1/4

1 000

2 000

1/2

3 000

3/4

4 000

1

5 000

(Joins sheet 65)

(Joins sheet 58)

(Joins sheet 67)

(Joins Sheet 73)

1 450 000 FEET

1 400 000 FEET

395 000 FEET

Monroe Heights

MONROEVILLE

PITCAIRN

Wall

TURTLE CREEK

Turtle Creek

COUNTY

WESTMORELAND

CONRAIL

QUARRY

N

1 Mile

5 000 Feet

Scale 1:15 840

(Joins inset, sheet 50)

(Joins Sheet 60)

(Joins Sheet 68)

(Joins Sheet 74)

Sturgeon

MC DONALD

Robinson Run

Hickman

Federal

Morgan Hill

Caddy Hill

Treveskyn

CAMPBELL AIRPORT

UCB

UCE

UCD

UB

Ln

Ne

Du

LbB

976

68

N

1 Mile

5,000 Feet

Scale 1:15 840

0 0 ¼ ½ ¾ 1

1 000 2 000 3 000 4 000 5 000

FEET FEET

(Joins sheet 62)

(Joins sheet 68)

(Joins sheet 70)

(Joins sheet 76)

MOUNT LEBANON

CASTLE SHANNON

Beadling

Foleys Siding

Linden Grove

Mollenauer

Washington Junction

Summit

Run

69

N

1 Mile

5 000 Feet

Scale 1:15 840

380 000 FEET

1 370 000 FEET

ALLEGHENY COUNTY, PENNSYLVANIA — SHEET NUMBER 70

70

N

1 Mile

5 000 Feet

Scale 1:15 840

0 6

1 000

2 000

3 000

4 000

5 000

1/4

1/2

3/4

1

(Joins Sheet 63)

(Joins Sheet 69)

(Joins Sheet 71)

(Joins Sheet 77)

1 390 000 FEET

BRENTWOOD

WHITEHALL

Prospect Park

Willock

Millin Junction

Saw Mill Run

Streets Run

Ang Creek

Ohio Creek

Norfolk and Western

Baltimore and Ohio

GSF UGD UCE UGB UCD UB DoD DoC DoB CuD CuC CuB GuD GuC GuB SmF SmD GQF CwD CwC Du Dw No


PITTSBURGH
ALLEGHENY COUNTY AIRPORT
DRAVOSBURG
MC KEESPORT
MONONGAHELA
RIVER
Thompson Run
Streets Run
UNION
(Joins sheet 64)
(Joins sheet 70)
(Joins sheet 72)
(Joins Sheet 78)
1 205 000 FEET
1 380 000 FEET
1 410 000 FEET
71
N
1 Mile
5 000 Feet
Scale 1:15 840

72

N

1 Mile

5 000 Feet

Scale 1:15 840

0 0 ¼ 1 000 ½ 2 000 ¾ 4 000 1 5 000

(Joins Sheet 65)

(Joins sheet 71)

(Joins Sheet 73)

(Joins Sheet 79)

1 430 000 FEET

1 445 000 FEET

380 000 FEET

Duquesne

Thompson Run

MONONGAHELA RIVER

CONRAIL

SPRAIL

UNION RR

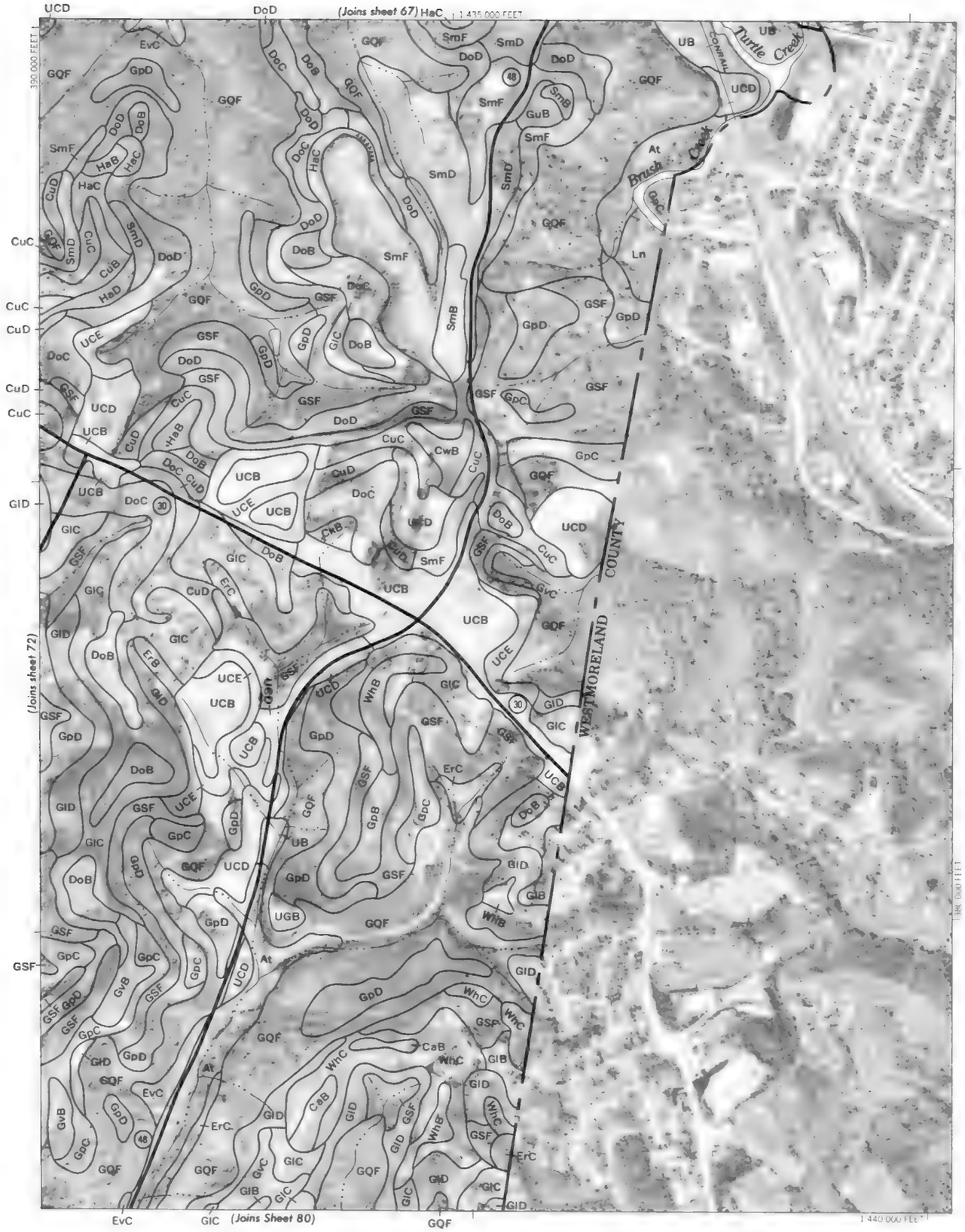
B&O

BALTIMORE AND OHIO

UCD UCB UCE UGD UGB UB GQF GSF URB URC UBC UWD UWC UCC UCG UGC UGE UGF UGG UGH UGJ UGK UGL UGM UGN UGO UGP UGQ UGR UGS UGT UGU UGV UGW UGX UGY UGZ

CuB CuC CuD DoB DoC DoD GpC GpD GrE GIC GID HaD SmD SmF CwC CwD Dw At AgC EnC WhB

837 30 51


(Joins sheet 67)
1 435 000 FEET
390 000 FEET
Turtle Creek
Brush Creek
COUNTY
WESTMORELAND
(Joins sheet 72)
(Joins Sheet 80)
1 440 000 FEET
380 000 FEET


1 430 000 FEET
(Joins Sheet 80)
360 000 FEET
YOUGHIOGHENY RIVER
COUNTY
WESTMORELAND
Youghiogheny River
LAKE ERIE
(Joins sheet 84)
355 000 FEET
(Joins inset, sheet 80)
1 435 000 FEET


73
N
1 Mile
5 000 Feet
Scale 1:15 840
0
1 000
2 000
3 000
4 000
5 000

74

N

1 Mile

5 000 Feet

Scale 1:15 840

1 330 000 FEET

(Joins sheet 67)

(Joins sheet 75)

1 350 000 FEET

375 000 FEET

365 000 FEET

(Joins sheet 81)

370 000 FEET

361 000 FEET

1 340 000 FEET

1 315 000 FEET

Mohawk Valley

Miller's Run

Glodden

WASHINGTON COUNTY

CONRAIL

NORFOLK SOUTHERN

National Rd.

US 19


(Joins sheet 68)
(Joins sheet 76)
(Joins sheet 74)
(Joins inset, sheet 74)
UCE
QUARRY
CONRAIL
CHARTIERS CREEK
CHARTIERS
WASHINGTON COUNTY
MAYVIEW STATE HOSPITAL
Boyce
Ph
Ne
Ln
Hu
UB
URB
UGD
UGB
UCD
RaA
RaB
RaC
GSF
CwB
CwD
CkB
CkC
DoB
DoC
DoD
DoE
GuB
GuC
GuD
LbC
LbD
SmB
AgB
AgC
CuB
CuC
CuD
1 Mile
5 000 Feet
Scale 1:15 840

76

N

1 Mile 5 000 Feet

Scale 1:15 840

1 0 1/4 1/2 3/4 1 5 000 4 000 3 000 2 000 1 000 0

370 000 FEET

1 355 000 FEET

1 370 000 FEET

375 000 FEET

(Joins sheet 69)

(Joins sheet 75)

(Joins sheet 77)

(Joins sheet 81)

BETHEL PARK

Garvey Mehan

Washington Junction

Hillcrest

Bethel

Brightwood

Loogview

Solida

Clifton

Walton

Brookside

Drake Loop

Broadlawn Highlands

Rutherford Acres

Coverdale

Boyce

Local

SOUTH PARK

Water

MONTOUR

NORFOLK

MEYERAN

CuC (Joins sheet 69)

UCE

CkB

GuD

Ne

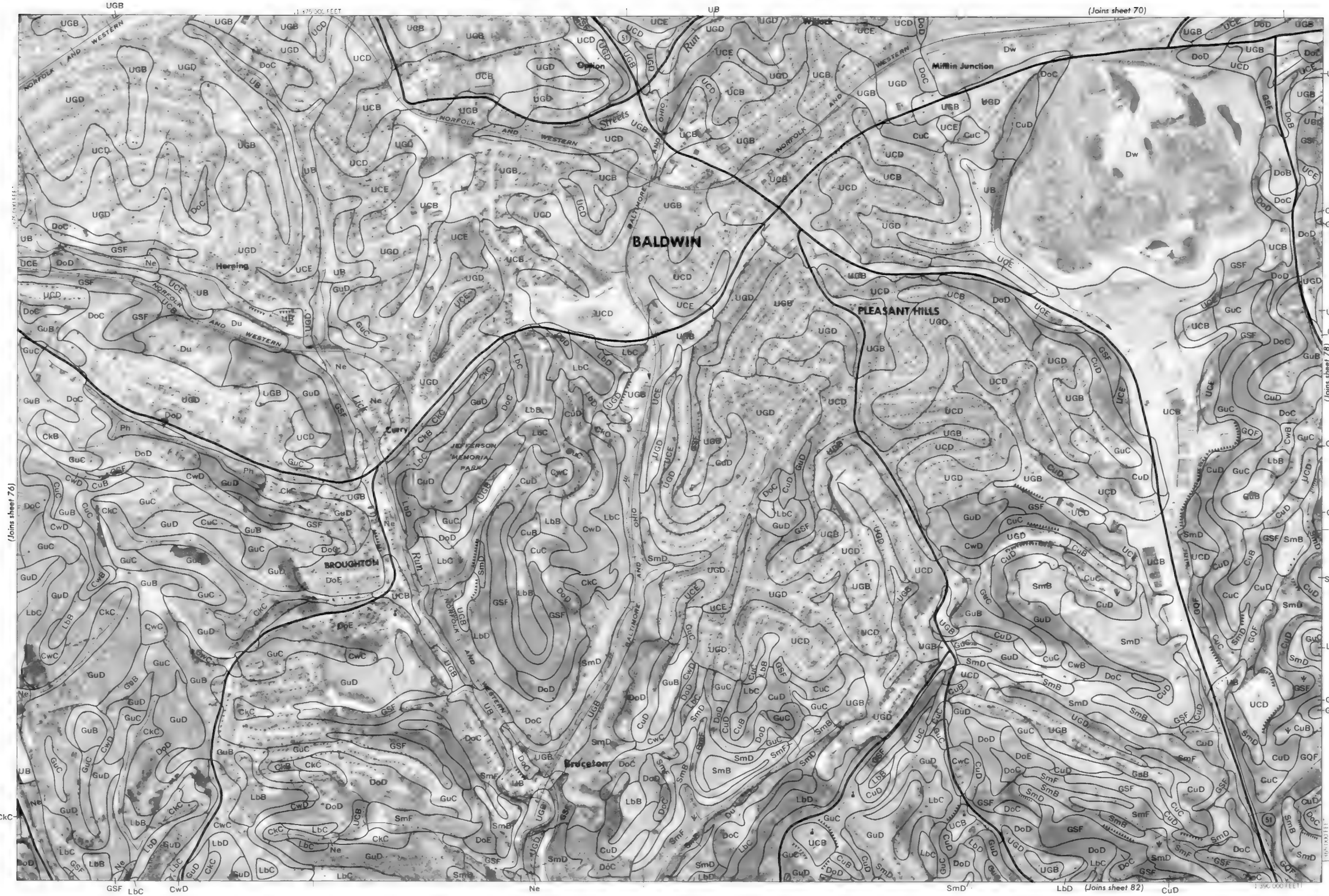
DoD

LbC

DoD

Ne

LbC


77
N
(Joins sheet 70)
BALDWIN
PLEASANT HILLS
BROUGHTON
Bruceton
Option
Millvale Junction
Herring
Curry
JEFFERSON MEMORIAL PARK
Streets Run
Chartiers Creek
Ohio River
NORFOLK AND WESTERN
BALTIMORE AND OHIO
(Joins sheet 76)
(Joins sheet 78)
(Joins sheet 82)
1 Mile
5 000 Feet
Scale 1:15 840
1 375 000 FEET
1 350 000 FEET

78

N

1 Mile

5 000 Feet

Scale 1:15 840

1 000

2 000

3 000

4 000

5 000

(Joins sheet 71)

(Joins sheet 77)

(Joins sheet 83)

(Joins sheet 79)

1 410 000 FEET

1 395 000 FEET

1 380 000 FEET

1 365 000 FEET

MONONGAHELA RIVER

Youghiogheny River

MC KEESPORT

PORT VUE

GLASSPORT

DRAVOSBURG

New England

Coal Valley

UNION PITTSBURGH AND LAKE ERIE

CONRAIL

N

1 415 000 FEET

375 000 FEET

(Joins sheet 72)

(Joins sheet 78)

(Joins sheet 80)

(Joins sheet 84)

1 425 000 FEET

365 000 FEET

1 Mile

5 000 Feet

Scale 1:15 840

MC KEESPORT

WHITE OAK

PORT VUE

YOUGHIOGHENY RIVER

PITTSBURGH AND LAKE ERIE

BALTIMORE AND OHIO

RENZIEHALUSEN PARK

COUNTY REGIONAL PARK

Eden Park

Versailles

Greenock

UBERTY

48

UCB UCD UCE URB URC UGB UGD UB GQF GIB GIC GID GSF GpB GpC GpD GvB GvC GvD RaB RaC AsC WhB WhC WhD DoB DoC SmB SmD CuB CuC CuD CwB CwC EvC EvD ErC ErD AgB AgC At Ln Ne

80

N

1 Mile

5 000 Feet

Scale 1:15 840

0 0

¼ 1 000

½ 2 000

¾ 3 000

1 4 000

5 000

1 435 000 FEET

375 000 FEET

365 000 FEET

1 430 000 FEET

1 433 000 FEET

350 000 FEET

340 000 FEET

1 430 000 FEET

(Joins sheet 73)

(Joins sheet 79)

(Joins inset, sheet 73)

(Joins sheet 87)

COUNTY REGIONAL PARK

WHITE OAK

WESTMORELAND COUNTY

YOUGHIOGHENY RIVER

PITTSBURGH AND LAKE ERIE

BALTIMORE AND OHIO

Youghiogheny River

Industry

Emblem

At GIC EvC GpC GIB GvC GID GQF GSF UCE UCB UB GpD WhC CaB SmD DoB CuB CaC DoC CuC LbB ErB WhD CwB WhB Ph CmB CkC UWB UCD SmB RaB Ra Ne URC AgB AgC GRB Du

(Joins inset, sheet 74)

(Joins sheet 76)

(Joins sheet 82)

81

N

1 Mile

5 000 Feet

Scale 1:15 840

0 1/4 1/2 3/4 1

1 000 2 000 3 000 4 000 5 000

1:355 000 FEET

1:370 000 FEET

Jewell

MONTOUR

Piney Fork

West Library

WASHINGTON COUNTY

PARK

SOUTH

LIBRARY

WEF

DoB DoC DoD DoE Ne UGD GuC GuD GuB CkB CkC CkD CuB CuC CuD CwB CwC CwD GSF LbC LbD LbB UCB UCD UB Du SmD RaB

ALLEGHENY COUNTY, PENNSYLVANIA — SHEET NUMBER 82

82

N

Scale 1:15 840

1 Mile

5 000 Feet

(Joins sheet 81)

(Joins sheet 77)

(Joins sheet 83)

(Joins sheet 85)

US BUREAU OF MINES EXPERIMENTAL STATION

Experiment

Gill Hall

Cochrans Mill

Piney Fork

Piney Fork

Snowden

Run

Peters Creek

BALTIMORE AND OHIO

NORFOLK AND WESTERN

MONTOUR

MONTOUR

QUARRY

WASHINGTON COUNTY

SmD SmF GQF GSF GuC UCE UCD

(Joins sheet 78)

(Joins sheet 82)

(Joins sheet 84)

(Joins sheet 87)

CLAIRTON

MONONGAHELA RIVER

Peters Creek

PITTSBURGH AND LAKE ERIE

NORFOLK AND WESTERN

CONRAIL

UNION

Wilson

Large

Scotia

Wylie

CITY PARK

1 395 000 FEET

1 405 000 FEET

355 000 FEET

N

1 Mile

5 000 Feet

Scale 1:15 840

84

N

1 Mile

5 000 Feet

Scale 1:15 840

1 : 410 000 FEET

(Joins sheet 79)

(Joins sheet 83)

(Joins sheet 87)

(Joins inset, 73)

Youghiogheny River

YOUGHIOGHENY RIVER

BALTIMORE AND OHIO

PITTSBURGH AND LAKE ERIE

Belle Bridge

Greenock

BOSTON

Mount Vernon

MOUNT VERNON CEMETERY

Coulter

Buena Vista

WESTMORELAND COUNTY

Youghiogheny River

GQF GuB GuC GuD DoB DoC DoD DoE SmB SmD SmF GSF CwB CwC CuB CuC CuD GpC GpD GvC GvD HaB HaC HTE UGB UGD UCB UCD UB URB URC Ne Ln AgB AgC RaA RaB RaC GtC GtD LbB EvC EvD ErC CmB

(Joins sheet 87)

N

1 Mile

5 000 Feet

Scale 1:15 840

1 375 000 FEET

1 385 000 FEET

1 395 000 FEET

1 405 000 FEET

1 410 000 FEET

1 414 000 FEET

350 000 FEET

340 000 FEET

324 000 FEET

321 000 FEET

INSET A

(Joins sheet 90)

(Joins inset B)

(Joins sheet 82)

(Joins sheet 86)

WASHINGTON COUNTY

INSET B

(Joins sheet 89)

(Joins inset A)

River Hill

East Monongahela

Monown

Gallatin

Sunny Side

MONONGAHELA RIVER

WASHINGTON COUNTY

86

N

Scale 1:15 840

1 Mile

5 000 Feet

1 405 000 FEET

1 350 000 FEET

1 340 000 FEET

1 390 000 FEET

(Joins sheet 83)

(Joins sheet 85)

(Joins sheet 87)

(Joins sheet 89)

MONONGAHELA RIVER

DAM NO 3

LOCKS

West Elizabeth

ELIZABETH

Blaine Hill

Floreffe

Hillside

Falton

Timber Run

Pangburn Hollow

WASHINGTON COUNTY

WASHINGTON COUNTY

PITTSBURGH AND LAKE ERIE

CONRAIL

LAKE ERIE

Du DoC DoB SmF GuD GuC CwD DoD GuB GSF GQF SmD SmB GpC GID URB UB RaB RaC RaA GLB CuC CuD CuB CkC CwC DoE SmC GvB GpD AgB ErC Hu Ne WhB WhC UCE UCB LbC

87

N

1 Mile

5 000 Feet

Scale 1:15 840

1 410 000 FEET

1 425 000 FEET

1 340 000 FEET

1 350 000 FEET

(Joins sheet 84)

(Joins sheet 86)

(Joins sheet 90)

(Joins inset, sheet 80)

Youghiogheny River

Youghiogheny River

PITTSBURGH AND LAKE ERIE

WESTMORELAND COUNTY

Blythdale

water

water

QUARRY

QUARRY

QUARRY

88

N

1 Mile

5 000 Feet

Scale 1:15 840

0 ¼ ½ ¾ 1

0 1 000 2 000 3 000 4 000 5 000

1 434 000 FEET

355 000 FEET

1 330 000 FEET

1 370 000 FEET

1 385 000 FEET

335 000 FEET

(Joins sheet 90)

(Joins sheet 85)

(Joins sheet 89)

WESTMORELAND COUNTY

Youghiogheny River

PITTSBURGH AND LAKE ERIE

WASHINGTON COUNTY

MONONGAHELA RIVER

Bunola

Elkhorn

URB

URC

AgB AgC CkB CkC CuB CuC CuD CwC CwD DoB DoC DoD Du GQF GSF GuB GuC GuD HaB Ln NeC RaA RaB RaC SmB SmD SmF UGB UGD

ALLEGHENY COUNTY, PENNSYLVANIA — SHEET NUMBER 89

89

N

1 Mile

5 000 Feet

Scale 1:15 840

1 000 000 FEET

355 000 FEET

1 325 000 FEET

1 405 000 FEET

(Joins sheet 86)

(Joins sheet 88)

(Joins sheet 90)

(Joins inset B, sheet 85)

MONONGAHELA RIVER

PITTSBURGH AND LAKE ERIE

WASHINGTON COUNTY

River Hill

Kellus Run

ALLEGHENY COUNTY, PENNSYLVANIA — SHEET NUMBER 90

90

N

(Joins sheet 87)

(Joins sheet 89)

(Joins inset, sheet 88)

(Joins inset, sheet 85)

1 425 000 FEET

1 410 000 FEET

1 335 000 FEET

1 325 000 FEET

Mustard

Smithdale

Youghiogheny River

PITTSBURGH

WESTMORELAND COUNTY

WESTMORELAND COUNTY

Scale 1:15 840

1 Mile

5 000 Feet